The ARCHITECTURAL FORUM

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First American Flag on French Front

CARRIED BY AMERICAN ARCHITECTURAL STUDENTS

IN the turbulent days of August, 1914, among those leaving Paris to enter training and prepare to go to the front, was a group of American students who had been studying architecture at L'Ecole des Beaux Arts. Forced by their devotion to Liberty and to France, these men had enlisted in the Second Division of the Foreign Legion and as they marched through the streets of Paris above their heads floated an American flag which had been presented to them by a group of American women. They carried this flag with them to their first camp in Rouen and, when Rouen was menaced by the enemy, on to Toulouse. Returning from Toulouse to Paris on their way to the front they spread their flag on the side of the cattle car which carried them. After arriving at the front they were not allowed to display the flag of a neutral country but they always honored it and protected it and when they went over the top some one of them always carried it wrapped around his body.

Finally the time came when the United States took its place in the war. The little group of American volunteers was scattered; three were dead, one seriously wounded, one a prisoner in Germany. One of the survivors sent the flag to the Rector of the American Church in Paris, calling upon him to offer it to the French government as the first American flag on the French front.

The day for the presentation of the flag was set for the Fourth of July, 1917. The first detachment of American troops to arrive in Paris took part in the ceremony which occurred in the Cour d'Honneur de l'Hotel des Invalides. The day was cloudy and delightfully cool. The balconies were filled and the walls of the old building, which had already seen so many glorious spectacles, formed a remarkable background. All was arranged by the Military Governor of Paris and his staff, with perfect taste. In the center of the court stood the French President, the Minister of War, Marshal Joffre and other well known Frenchmen, surrounding the American Ambassador and General Pershing. Before them were ranged three groups of flag bearers. The American band played, followed by the French band. Then the American troops advanced, marching with their swaggering, rolling gait, a little like that of a sailor. They were spick and span and evidently husky.

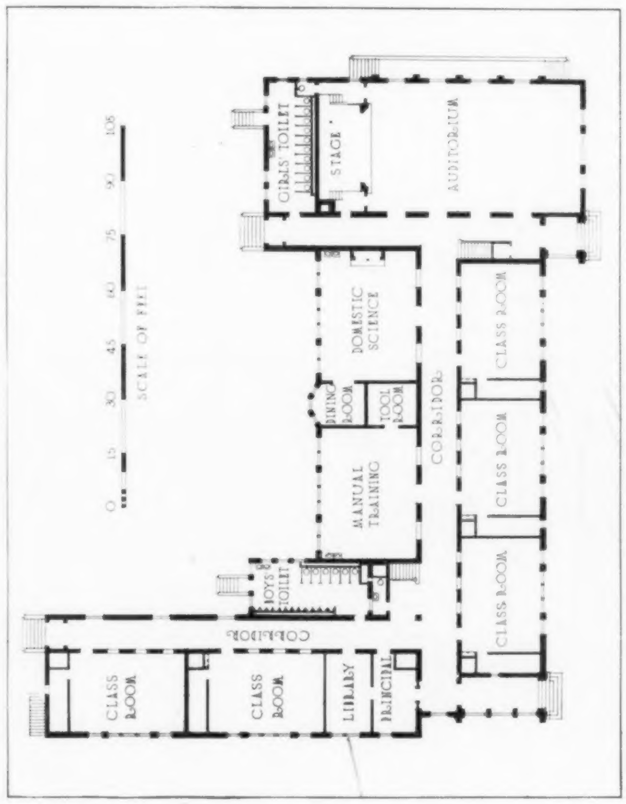
Then came the old territorials, muddy, in their faded uniforms. How dear they were to the Parisians, Frenchmen and foreigners, and how these old poilus were applauded, and how proud Paris was of them when they took their place, marching with the same quick, confident step they had in August, 1914! The American band played the "Marseillaise." The French band played the "Star Spangled Banner." Then General Pershing was presented with a girdon by the descendants of the soldiers who fought with Washington and Lafayette in the American revolution, and also with a banner made by the women of Puy.

Then came the moment for honoring these men of the Foreign Legion. The great American army had taken their place. The pioneers of Liberty could retire. The Rector of the American Church in Paris came forward, accompanied by Charles Carroll carrying the flag. The Rector spoke first to General Pershing, saying that this flag was being proudly given to the French by the men who were the pioneers of the American forces, now that it would be replaced by the new banner of his army. He confided to the General the finishing of the task so bravely started. Then the Rector turned to the noble veteran, General Niox, and presented the flag, saying that it was the prophet of the coming of America to the place where she was in spirit from the first.

In the heart of Paris, which is the heart of France, rests the first American flag which was carried on the French front in the great war. It is surrounded, protected by stone walls, stones unconscious of this honor—but the memory of those who carried this flag where it received its first baptism of blood, will be guarded in the hearts of us all, American and French, and will remain forever.

For these notes we are indebted to Rev. Dr. S. N. Watson, Rector of the American Church in Paris for ten years, including the period of the war. Dr. Watson was in charge of the commission organized by the French government in behalf of the orphaned children of France and was made a Chevalier of the Legion of Honor at the close of the war.—*The Editor.*

VIEW OF AUDITORIUM WING



FIRST FLOOR PLAN

TOWER AND LOGGIA ENTRANCE

LA VILLA SCHOOL, JACKSONVILLE, FLORIDA

MARK & SHEFTALL, ARCHITECTS; WILLIAM B. ITTNER, CONSULTING ARCHITECT

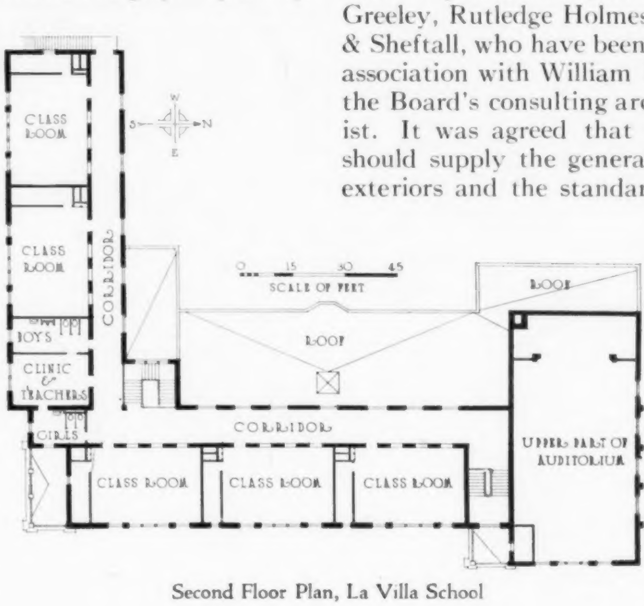
Some Recent Florida Schools

THE WORK OF WILLIAM B. ITTNER, CONSULTANT, AND COLLABORATING ARCHITECTS

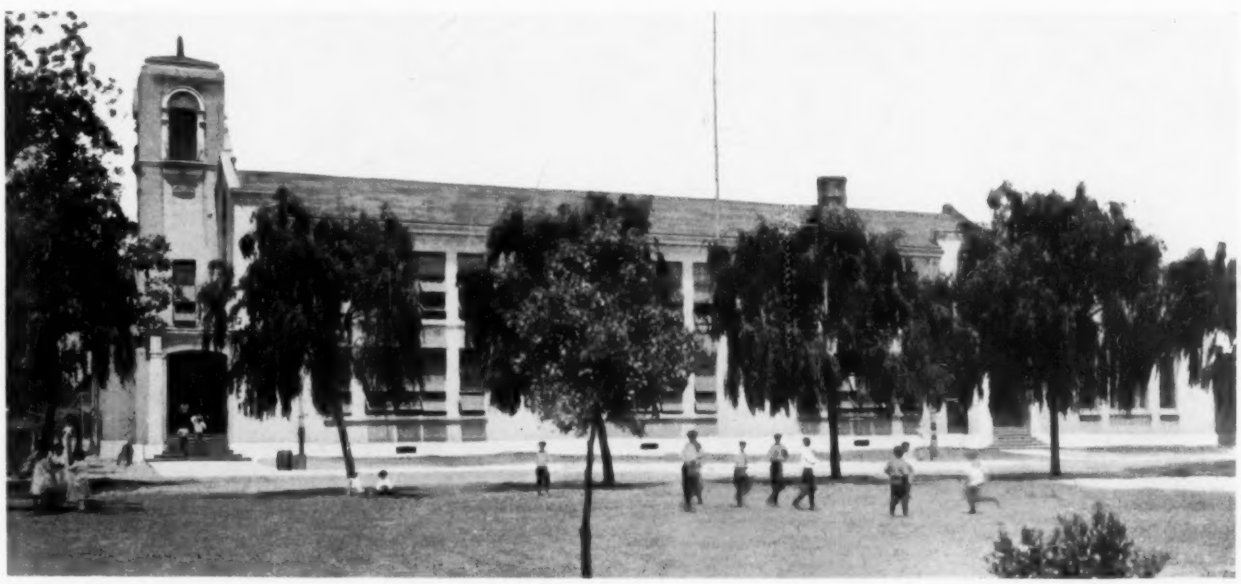
THE building of schools throughout the country is a subject of importance today to local governing bodies. Not only is there an acute shortage of buildings because of the period of non-building during and since the war, but because the standards of public education have been so greatly raised and new subjects added to curricula there are countless schools that are now inadequate and must be replaced. We thus see large building programs being undertaken involving the construction of several schools in a community at one time. The design of schools has become largely a specialty with a number of architects, and it is becoming increasingly frequent to effect a working arrangement for the execution of a school program between local architects and a school specialist as consulting architect. The schools illustrated in these pages have been designed under such an arrangement and show eminently practical results.

Early in 1915 Duval County, Florida, voted $1,000,000 for the construction of a number of school buildings. The building program, as determined by the Superintendent of Schools, included the erection of 14 small schools in various parts of the county, varying in sizes from 2 to 4 rooms, while in Jacksonville, besides additions to four existing schools, there were to be four 8-room buildings and three schools having 12, 16 and 18 rooms respectively. Fully realizing the importance of securing economical construction and the utmost in architectural and practical value which could be had, the School Board selected a number of architects in Jacksonville, R. A. Benjamin, Mellon C. Greeley, Rutledge Holmes, H. J. Klutho and Mark & Sheftall, who have been in charge of the work in association with William B. Ittner of St. Louis as the Board's consulting architect and school specialist. It was agreed that the consulting architect should supply the general data for the plans and exteriors and the standardization of construction, finish, heating, ventilating and sanitation of the different buildings, the actual plans and supervision being supplied by the Jacksonville architects.

As a guiding principle it was agreed that all the school buildings, large or small, should be planned with a view to easy and logical en-



Second Floor Plan, La Villa School



General View of La Villa School, Jacksonville, Florida

Mark & Sheftall, Architects; William B. Ittner, Consulting Architect

largement, and in view of climatic conditions it was thought best that an open plan be adopted and that classrooms be placed upon but one side of a corridor. It was found to be advisable that the smaller schools be developed as one-story structures and that larger schools be limited in height to two stories with the lower floors, under normal site conditions, raised from 3 to 4 feet above grade to insure dryness and to provide sufficient room for steam mains, ducts, etc. In order that due economy of cubic space be observed it was decided that the width of both main and side corridors be established at 10 feet and that classrooms be planned for a maximum of 40 pupils, the size being uniformly 22 x 32 with wardrobe spaces 5 feet 6 inches in width. Lighting and ventilation for classrooms were provided by windows placed upon only the long axes of rooms, with smaller windows for ventilation in the inner walls above the blackboards; outside light was recommended, wherever possible, for the wardrobe spaces.

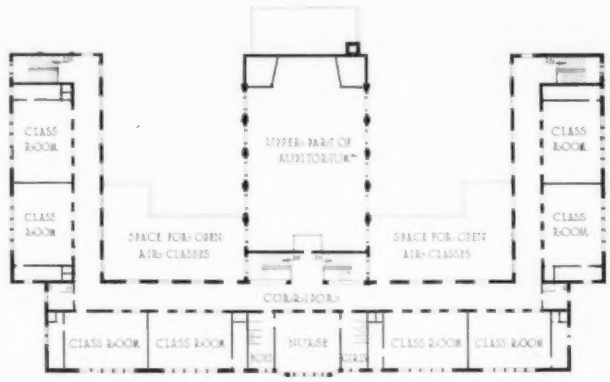
A school building having 8 rooms or more was planned to include, in addition to the classrooms:

Principal's office.	Wood working shop.
Teachers' rest and work rooms.	School library.
Assembly room.	General and private toilet rooms.
Domestic science laboratory.	General storeroom.

Space for heating and mechanical plant.

Other details of planning were also systematized. The principal's office and teachers' rooms were approximately 13 x 16 in size and were placed, in each instance, upon the lower floor and near the main

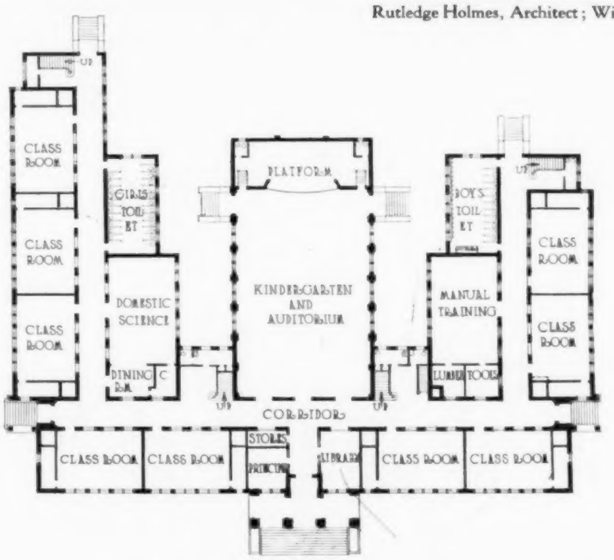
First Floor Plan



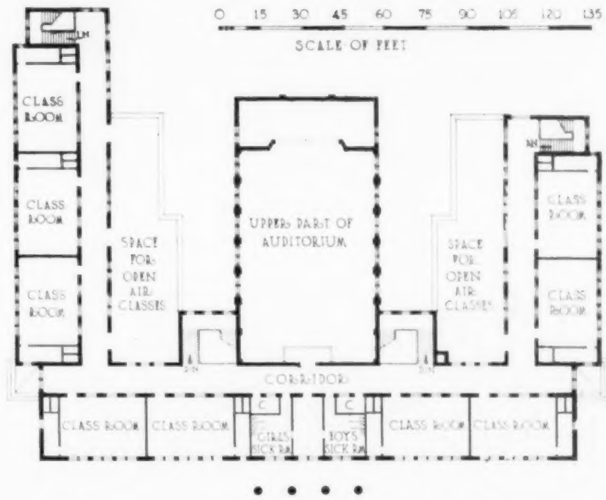
Second Floor Plan

South Jacksonville School, Jacksonville, Florida
Mark & Sheftall, Architects; William B. Ittner, Consulting Architect

General View, Riverside School, Jacksonville, Florida
Rutledge Holmes, Architect; William B. Ittner, Consulting Architect



First Floor Plan



Second Floor Plan

entrance for convenience of administration. The assembly rooms were really combinations of gymnasiums, kindergartens and auditoriums and were connected with the rooms upon the main floors devoted to domestic science or home economics. Each of the assembly rooms was equipped with a small stage and provided with adequate exits. For convenience of service the school library in each building was placed upon the second floor, opening directly to the main stairway and entrance.

Shop quarters were also worked out upon a definite plan, with a large, undivided area, 24 x 36, upon the main floor, to be subdivided if necessary by movable partitions into smaller shops. Toilet rooms in each school were planned for both floors, those upon the lower floor having entrances from the playground as well as from the corridor. Since there were no basements the boiler rooms were planned apart from the school buildings with their floors somewhat below the first floor levels of the schools.

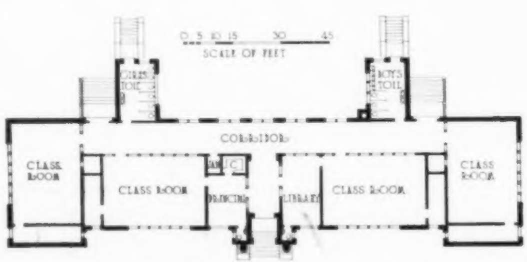
The St. Petersburg High School, located in one of the rapidly growing Florida communities, shows a more ambitious architectural scheme than the Jacksonville schools and was planned with a view to securing a structure adapted to climatic conditions and adapted as well to the accommodation of a fluctuating number of pupils. St. Petersburg is one of the most popular of the Florida winter resorts and the maximum enrollment is usually reached during the winter months. Although the building is not strictly of an open plan type, owing to the restricted site, maximum lighting and ventilation were secured by means of ventilating windows along the inner walls of classrooms. The building is three stories in height but this height is somewhat modified by reason of the fact that the pupils' entrances give directly to the first or intermediate

Grand Park School, Duval County, Florida
Rutledge Holmes, Architect; William B. Ittner, Consulting Architect

floor, while entrances to the front and rear give to the ground or auditorium floor level.

The building is rich in facilities and equipment, containing besides its classrooms a study hall, an excellent auditorium, a standard gymnasium, home economics rooms, commercial rooms, vocational shops, a full set of science laboratories, free hand drawing and music studios. The classrooms, 14 in number, are planned to accommodate 30 pupils each. One of the rooms, however, was enlarged for double classes. The study hall is located on the second floor. An interesting feature of this hall is that the inner portion is appropriated for reference library uses. This is accomplished by means of a partial partition in the form of an arcade. The auditorium extends through the ground and first floor levels, arranged in amphitheater fashion, and is without gallery. The stage is made of gymnasium size so that indoor games, large choruses, etc., are possible in full view of the audience. There are two laboratory groups, each including a lecture room and an instructor's office. One group includes the physics and chemistry rooms and the other the botany and physiography laboratories.

The prevocational activities for both boys and girls are well provided for. A cooking room, sewing and millinery room and a model housekeeping suite serve the girls. The school's cafeteria and lunch room connect with this home economics group. A one-story shop wing to the rear of the main building serves the boys. This wing is planned for easy enlargement in case an expansion of curriculum activities should demand it. The commercial rooms on the ground floor serve both boys and girls and include typewriting and bookkeep-



Plan of Grand Park and Woodstock Schools

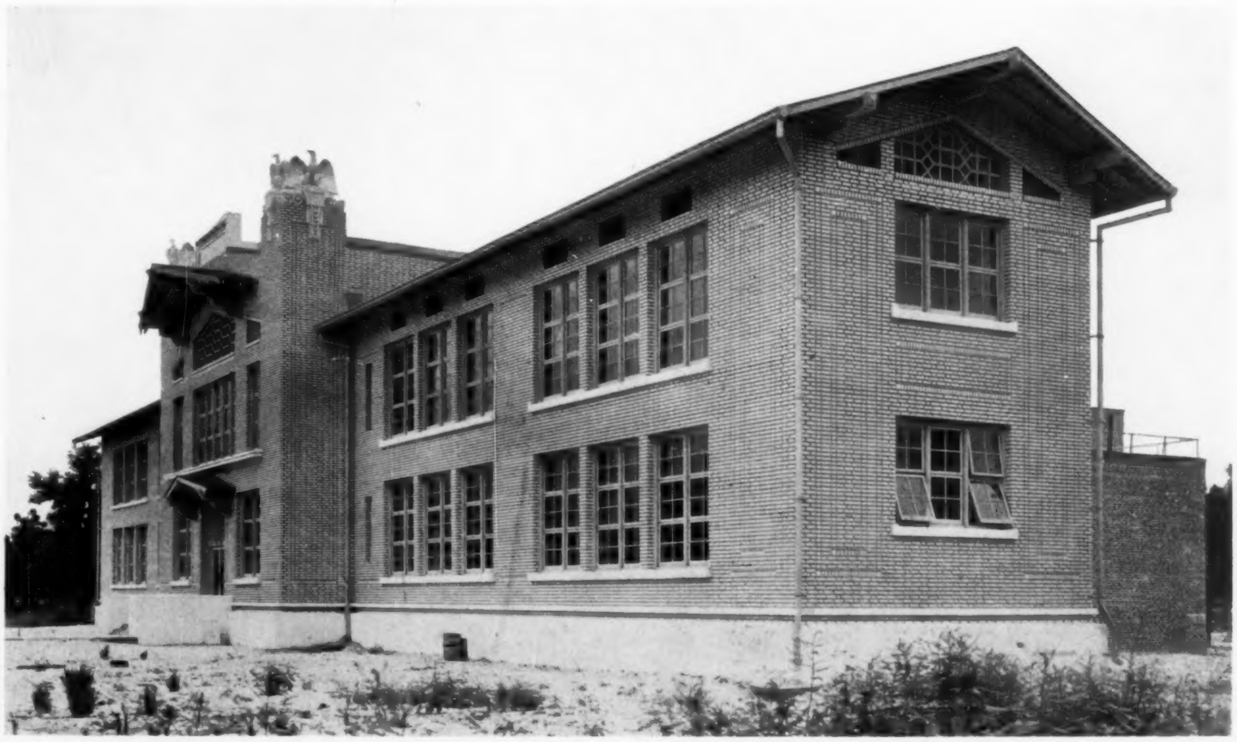
Woodstock School, Duval County, Florida
Rutledge Holmes, Architect; William B. Ittner, Consulting Architect

Stanton School, Jacksonville, Florida
Mellon C. Greeley, Architect; William B. Ittner, Consulting Architect
Accommodates 932 pupils and includes Auditorium seating 500

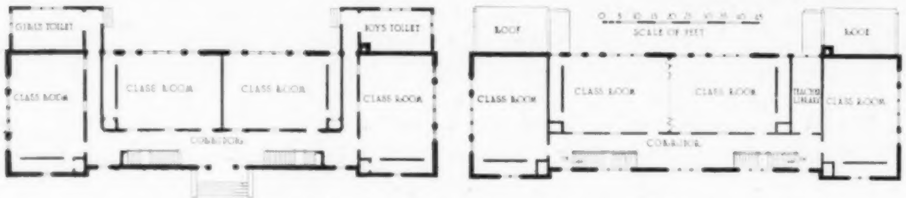
ing rooms. A school bank supplies an interesting addition to the latter rooms. Adequate locker rooms and toilets are located on each floor. Ample provision is also made for showers in connection with the gymnasium.

The building contains several administrative groups, all being located on the main floor. There are rooms for the Board of Education and the Superintendent of Schools. Aside from these, there is an office for the principal of the school besides a general office and the necessary storerooms.

The construction costs on the Jacksonville schools were remarkably low, even for the pre-war year 1917 during which the buildings were completed. The cubic foot cost figures were quite uniform and varied between 11 and 13 cents, which included all



Panama Park School, Jacksonville, Florida
H. J. Klutho, Architect; William B. Ittner, Consulting Architect
Accommodates 448 pupils and includes Auditorium seating 320



Exterior and Plans of Typical School for Colored Children
Mark & Sheftall, Architects; William B. Ittner, Consulting Architect

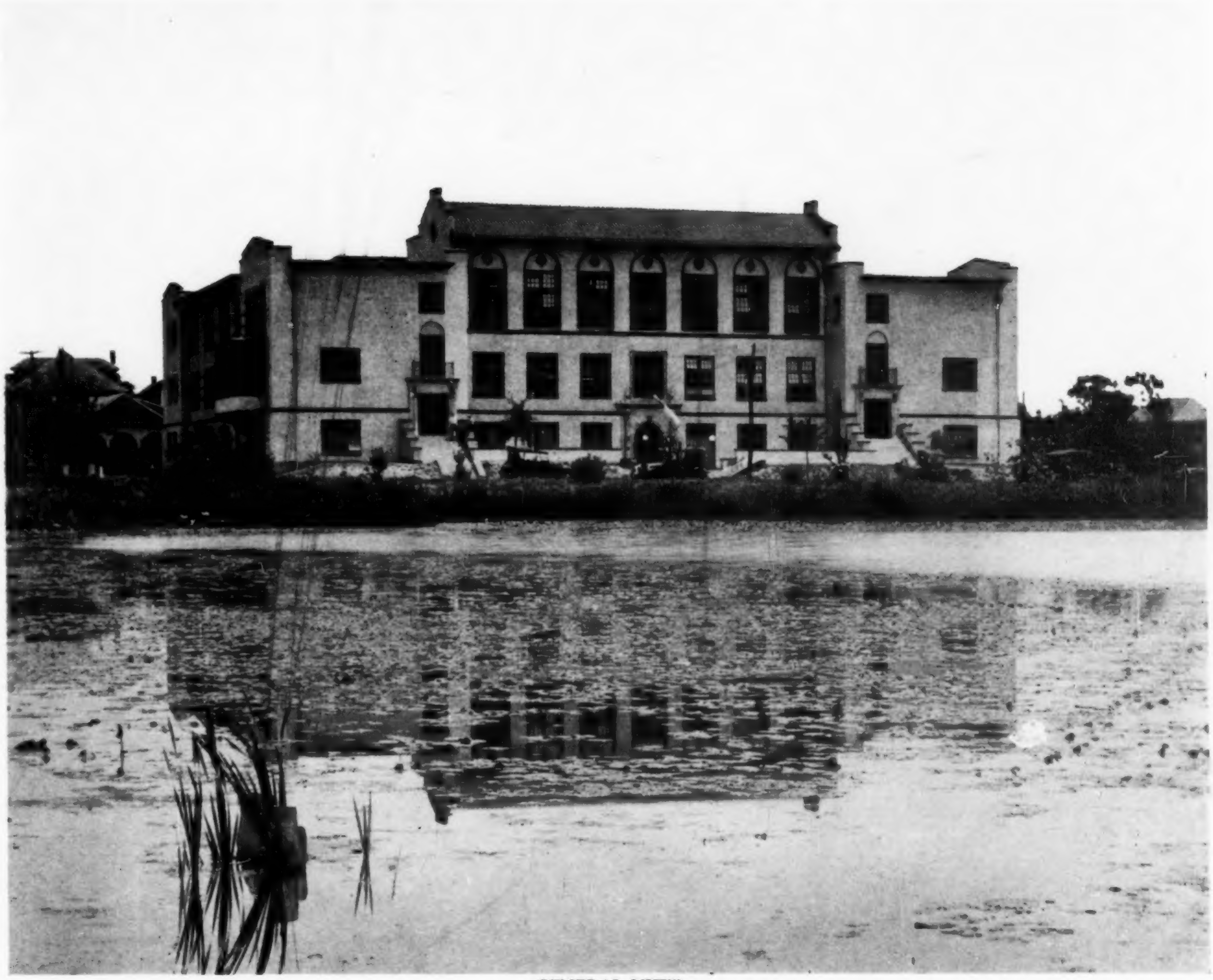
mechanical and sanitary equipment but not seating or similar furnishings which usually come under the head of equipment. These costs were possible largely through the standardization of plan, and also because of the choice of inexpensive yet wholly durable materials and the absence of elaborate architectural features, either inside or out. The principal purpose in the design of these buildings was to secure efficient school plants, well planned from climatic and administrative points of view; architectural effect was necessarily a secondary consideration, but has been nevertheless achieved to a satisfactory degree with only such elements as mass, general proportions, fenestration and simple cornices and trim as dictated by actual structural requirements, upon which to depend.

The single-story schools are of second class construction with wood floors, partitions and roof framing and solid exterior walls of brick or tile with stucco coating. The larger schools are of semi-fireproof construction up to the roof levels, the roof framing and ceilings of the second floors being of wood. Exterior walls are generally of brick as are also all bearing partitions; minor partitions between classrooms are of wood, stucco plastered. The floors are of varied types of reinforced concrete, some of beam and girder type with tile fillers where flat plaster ceilings were required, and others of concrete slabs and reinforced supporting girders. Interior stairs are of reinforced concrete with cement finish and equipped with safety treads.

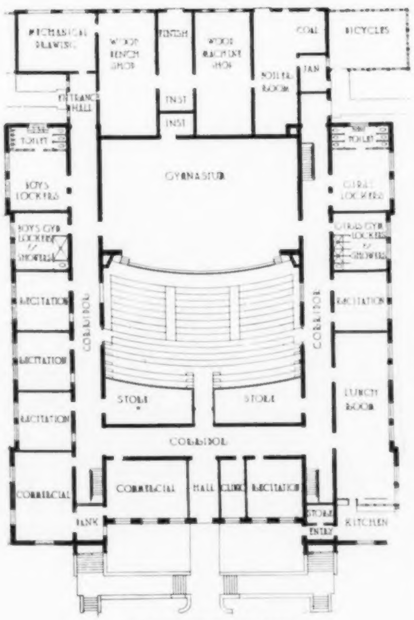
The roofs are of simple, inexpensive construction with wood trusses where they are required; those schools with parapet walls have flat gravel roofs laid on wood boarding; the buildings with visible roofs are for the most part covered with asphalt shingles. Exterior trim and architectural detail on the larger schools are of cast concrete, and in the one-story schools, of wood.

The classrooms are severely plain, finished with tinted plaster walls and in some cases with face brick wainscots to the tops of the blackboards. The windows and doors are set in plaster reveals with no wood trim save a small moulding to cover the frames; all interior window sills are of face brick. Classrooms and corridors have upper floors of wood. The windows are of an open air type.

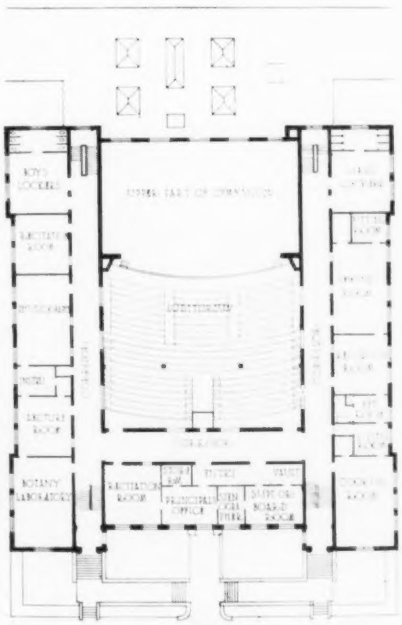
Fairfield School, Duval County, Florida
Typical of the eight-classroom schools



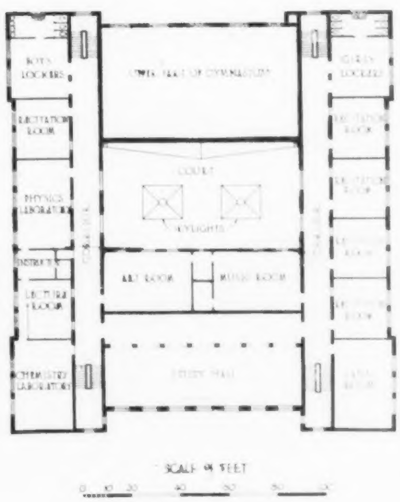
GENERAL VIEW



BASEMENT PLAN



FIRST FLOOR PLAN

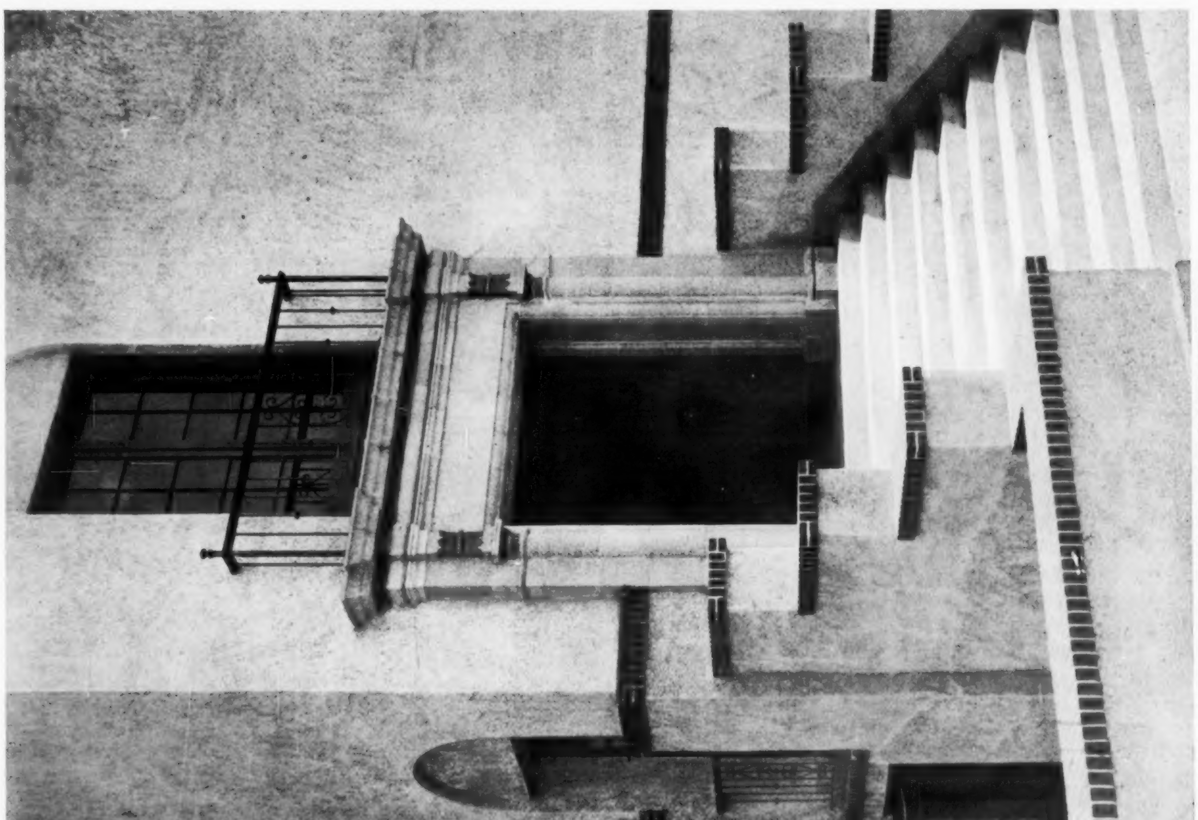


SECOND FLOOR PLAN

HIGH SCHOOL, ST. PETERSBURG, FLORIDA

WILLIAM B. ITTNER, ARCHITECT

DETAIL OF MAIN ENTRANCE

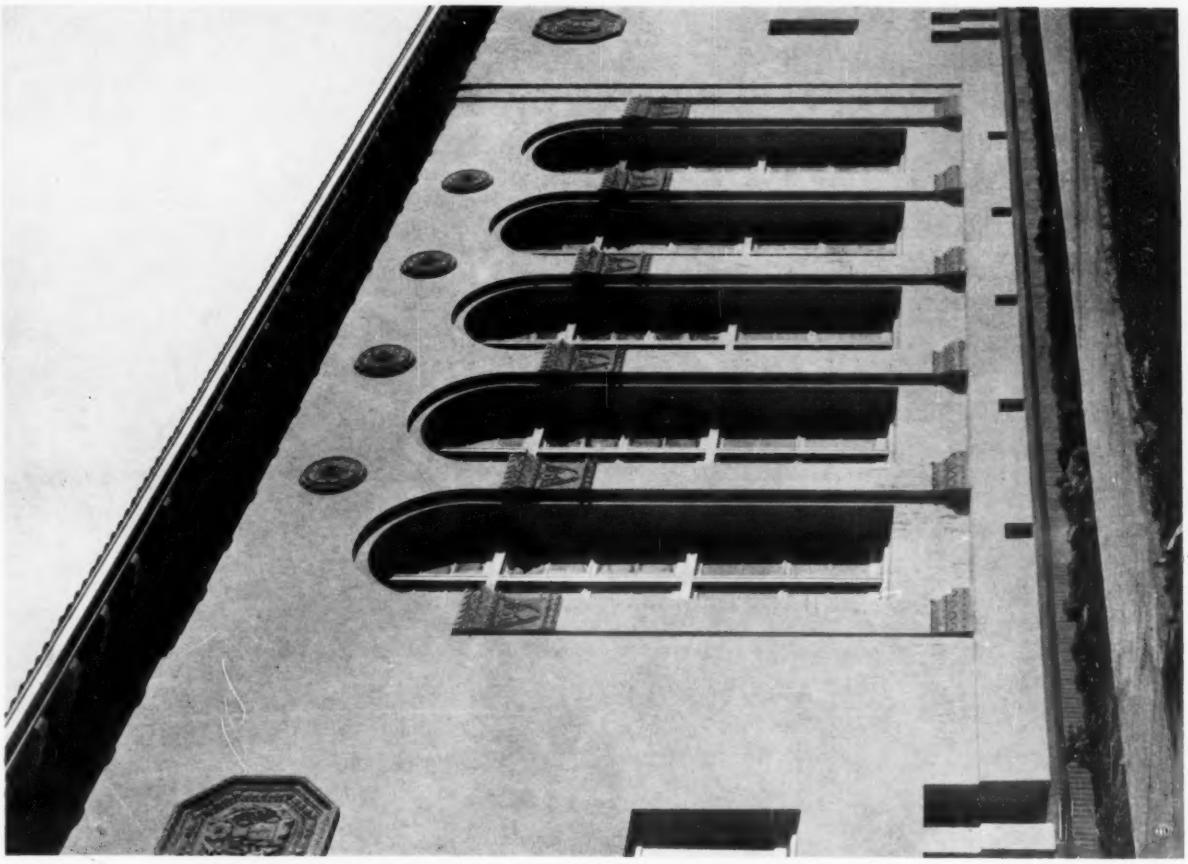


DETAIL OF ENTRANCES TO WINGS

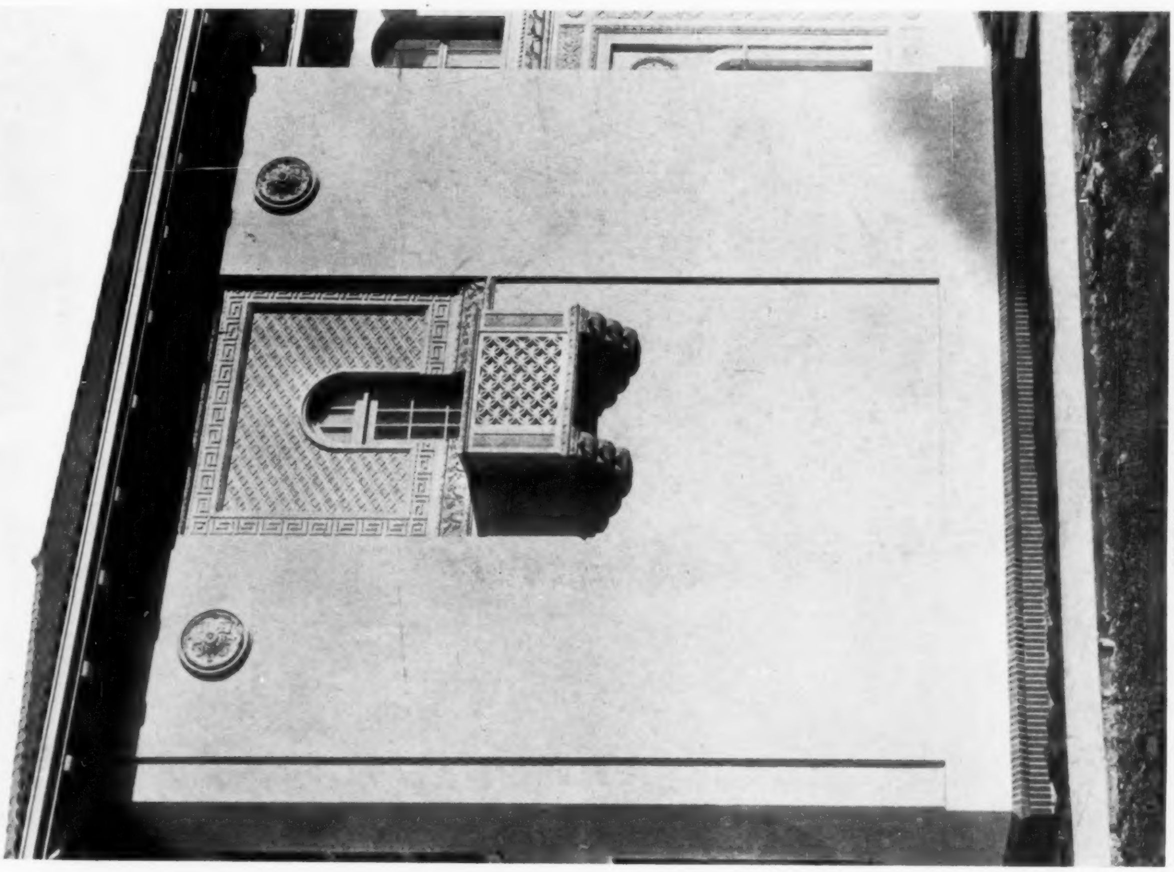
HIGH SCHOOL, ST PETERSBURG, FLORIDA

WILLIAM B. ITTNER, ARCHITECT

GENERAL VIEW
HIGH SCHOOL, WATSONVILLE, CALIF.
WM. H. WEEKS, ARCHITECT



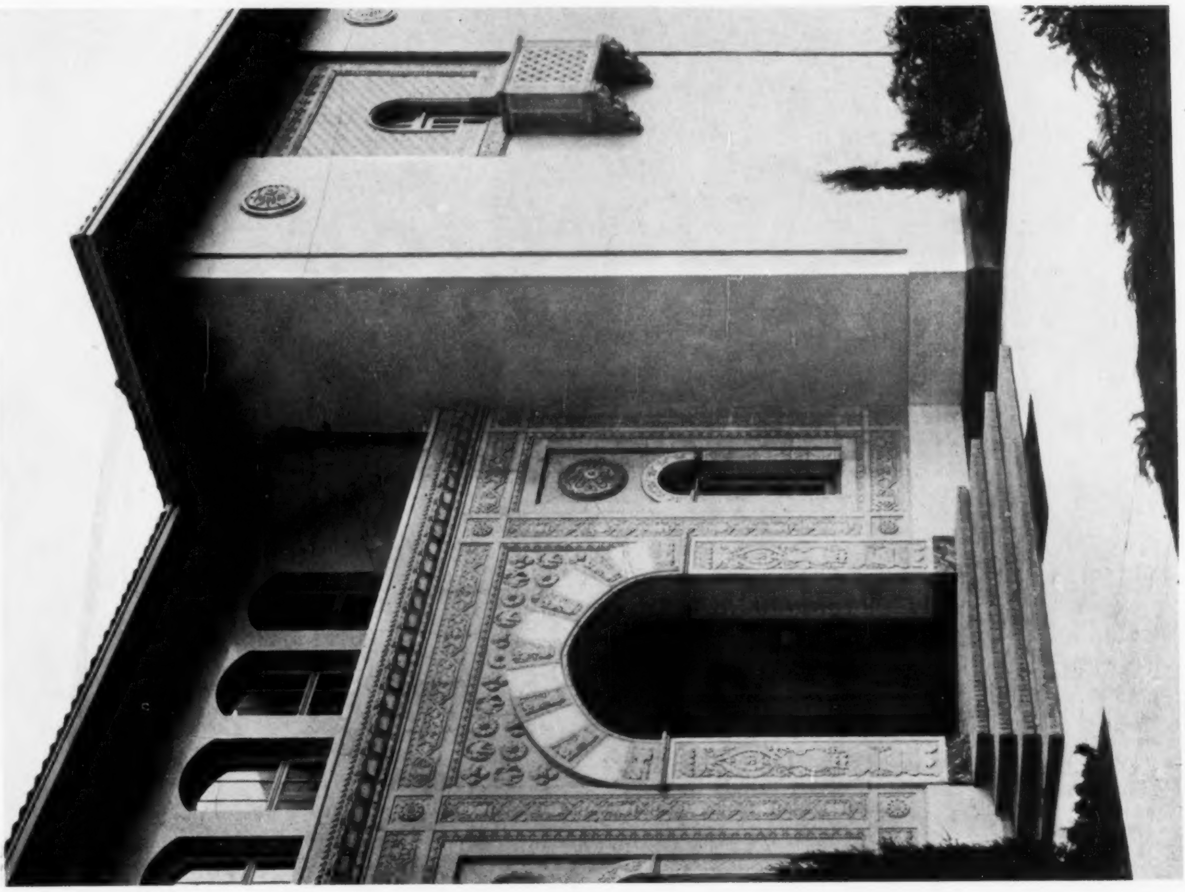
DETAIL OF ASSEMBLY HALL FACADE

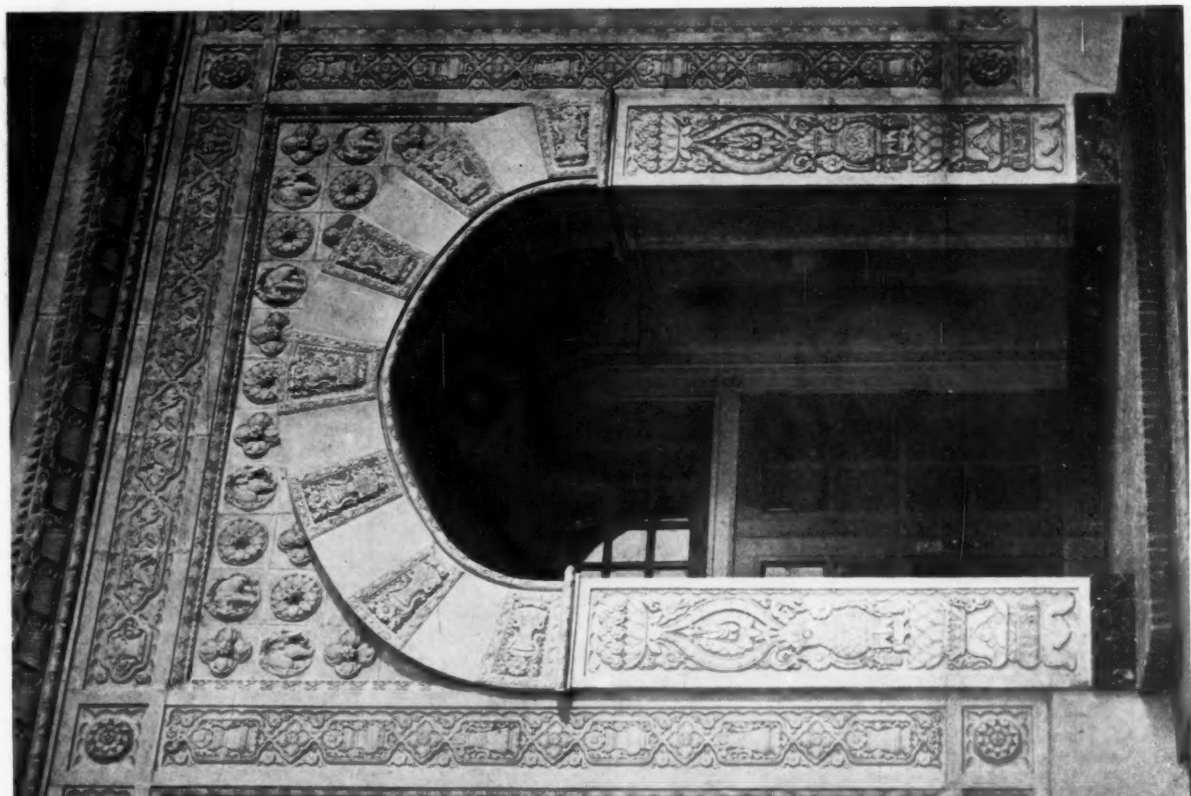


DETAIL OF END PAVILION

HIGH SCHOOL, WATSONVILLE, CALIF.

WM. H. WEEKS, ARCHITECT





DETAILS OF ENTRANCE AND END PAVILION

HIGH SCHOOL, WATSONVILLE, CALIF

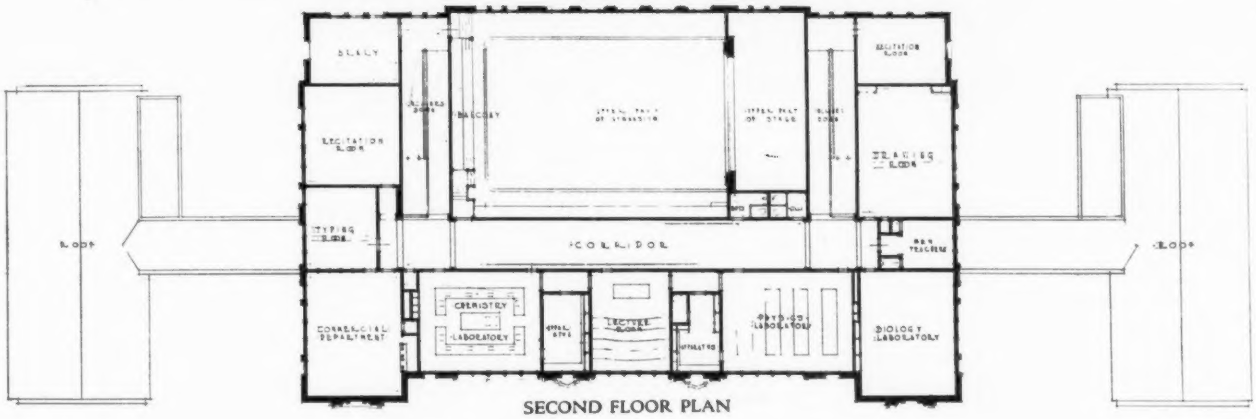
WM. H. WEEKS, ARCHITECT

DETAIL OF ENTRANCE

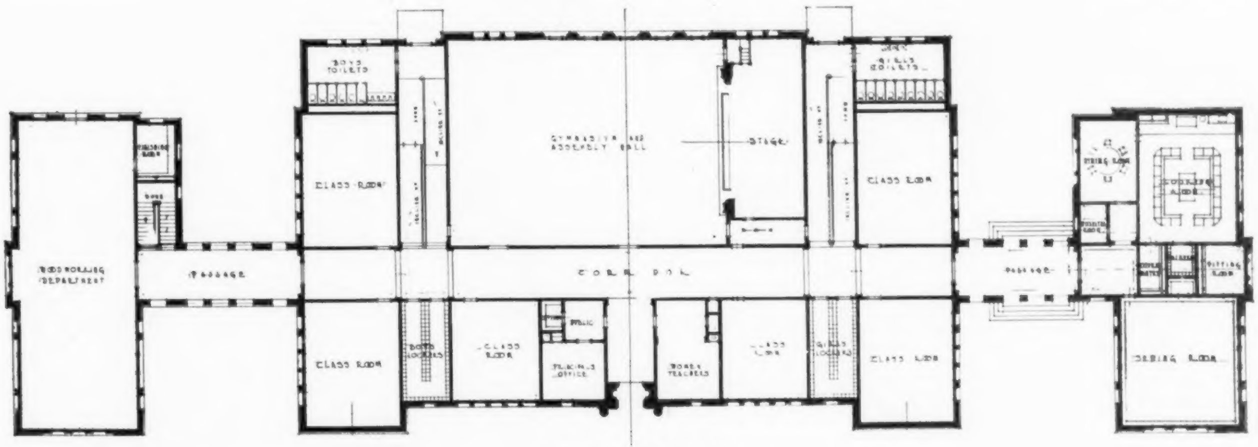
HIGH SCHOOL, HEALDSBURG, CALIF.

WM. H. WEEKS, ARCHITECT

GENERAL VIEW



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HIGH SCHOOL, HEALDSBURG, CALIF.

WM. H. WEEKS, ARCHITECT

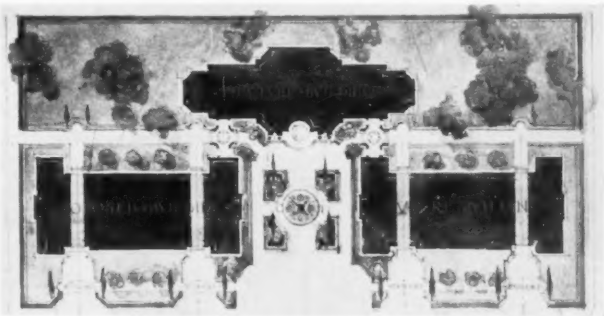
Two California Schools

WM. H. WEEKS, ARCHITECT

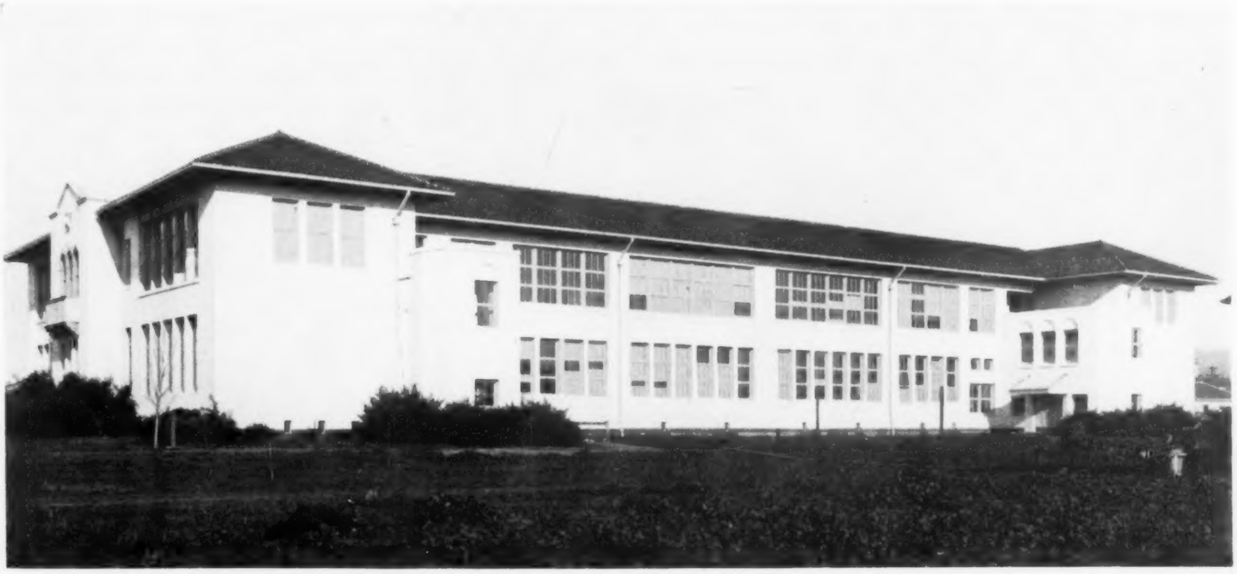
THE design and plan of school buildings, even under the exacting conditions which the past few years have imposed, are steadily attaining a higher development which will surely have an important influence in raising the general public standards of taste.

One particular tendency noted today, and perhaps especially in school buildings, is the use of architectural types which are especially associated with particular regions. In THE FORUM for February, 1921, there were shown views of the Tower Hill School at Wilmington, Del., built of brick and of a type which was frequently used in that locality during revolutionary days, and there are many interesting uses of the early New England styles for schools in the east; other parts of the country which have inherited well defined types of building are developing school structures according to their local traditions. No portion of the country is heir to a more marked and distinctive type of architecture than California,—the type in which the early Spanish settlers built their structures, many of which yet remain. These old buildings, which were often of considerable size, were developed in stucco which even the workmen of centuries ago were able to work into simple forms of ornament, and this type adapts itself well to building of concrete and to the use of ornament of terra cotta, cast concrete and other forms of plastic materials.

As recent and good examples of modern school buildings, planned in an architectural style which belongs by right of inheritance to the locality and constructed of materials which are in every way suitable and practical, are presented the two California schools illustrated in these pages. The breadth of scale and the wide expanses of wall with which the early Franciscans built their missions adapt well to use for buildings of more than ordinary size. The illustrations of the high school at Watsonville show a structure of marked Spanish characteristics with considerable use of oriental details such as abound in much Spanish work. The use of reinforced concrete with plain surfaces treated with waterproof cement coating for the walls and the massing of ornament of cast concrete about doorways, balconies and at certain other points, create that strong contrast, that play of light and shadow amid surfaces plain and unadorned, which has always been highly valued by Spanish builders. Entirely unbroken by dormers of any kind are the broad roof surfaces covered with tiles which project over the walls themselves to form wide soffits. The architect, in this instance, has been unusually successful in the treatment of window spaces. Particu-

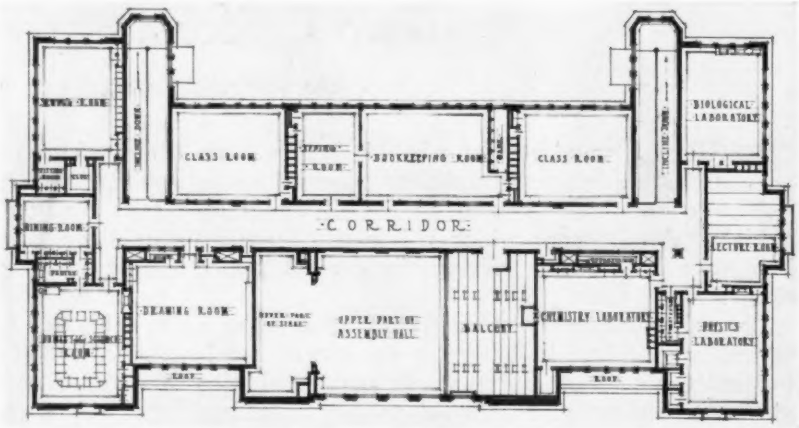


Plot Plan of Proposed Group at Watsonville



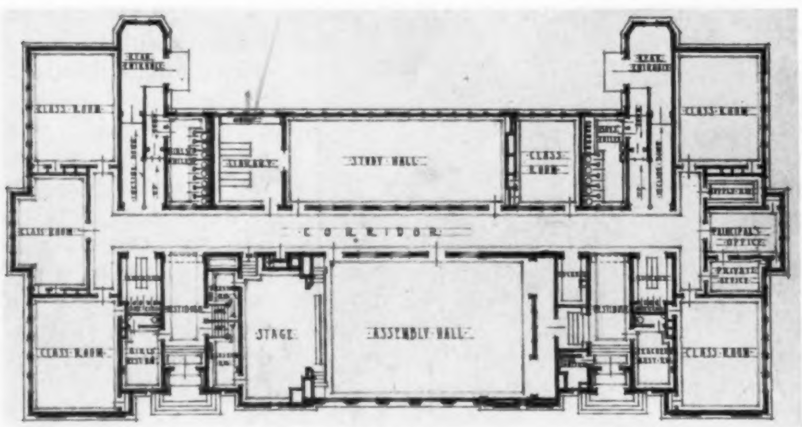
Rear of Watsonville High School Showing Expanse of Sash for Convertible Open Air Rooms

larly in a school building large windows are necessary, but ordinarily they are so disposed that they give to school structures much of the appearance of model factory buildings. The use of color in various ways adds materially to the interest of this building. The rich color and texture of the brick used for steps and entrance platforms and for the foundations where they are exposed, afford an excellent contrast with the concrete walls. The cornices and the trim about windows are of gray-green.

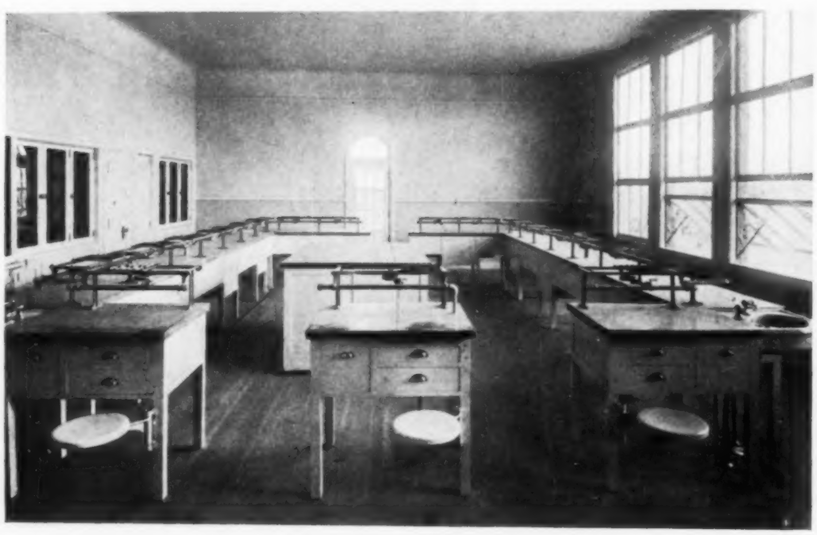


Second Floor Plan, Watsonville High School

This is one of a group of three school buildings which will eventually form a notable educational center. The plan of the structure already completed presents an excellent arrangement for a school of this kind in which are taught all the subjects now generally included in the high school curriculum. A considerable portion of the main floor is planned as an assembly hall, seating about 600, with a stage and the usual dressing rooms, and since this hall is of full two-story height a balcony at one end provides additional seating capacity. This assembly hall embodies several interesting details of equipment. A portion of the floor is level, that it may be used for dancing or exercises requiring a level space; provision has been made for storing the seats in a space under the floor, and the electric lights in the ceiling are arranged to be lowered on cables for replacement or cleaning. The stage is arranged for the use of stage effects, and with provision for raising instead of lowering scenery. The use of motion pictures is similarly provided for.



First Floor Plan

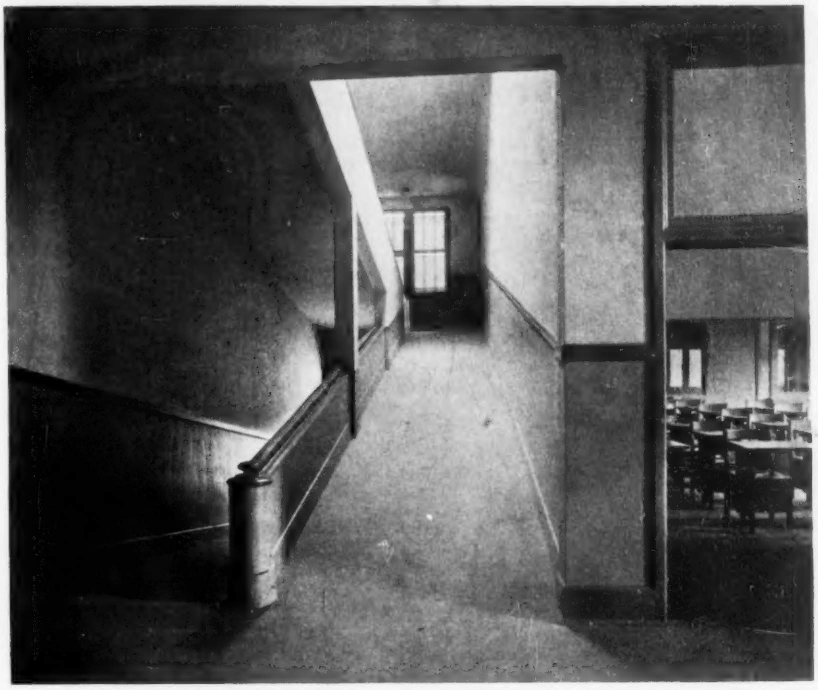


Domestic Science Room, Watsonville High School

The liberal planning of the building makes possible such other departments as a study hall, a library, lecture room, laboratories for the use of the departments of chemistry, physics and biology, and an office and a private office for the principal. The larger of the rooms devoted to the teaching of domestic science is placed at one corner of the building and connects through a pantry with a dining room in which meals are served from the domestic science department. Study of the floor plans will show an unusually successful working out of entrances, particularly from the school playgrounds, with ramps or inclines instead of stairways between different floor levels. This use of ramps is said to be the first instance of their installation in a school and promises to remove entirely the possibility of stumbling with consequent loss of life in case of a panic; the ramps have a slope of approximately 20 per cent and are, furthermore, fireproof. An added factor of safety is the provision by which doors

between classrooms and halls open *out* to facilitate egress from such rooms.

The building faces north and is so orientated that assembly hall, drawing rooms and laboratories take up this frontage, leaving the classrooms situated to receive direct sunlight. Arrangement and equipment of the various laboratories are unusually good and are the result of careful thought and attention to details. The chemical laboratory is a fireproof room having an artificial stone floor and concrete and metal walls. Every possible detail of equipment has been supplied to provide all facilities for the work of the department; numerous sinks are supplied with hot and cold water and the tops of the tables and counters are of material proof against injury by chemicals, acids or even careless handling. A useful feature is the installing of individual experimental hoods for the use of pupils, these hoods being connected with specially made exhaust fans for the removal of fumes. In the biological laboratory are glass topped tables, cases and sinks necessary for such a department, and all the laboratories are provided with the necessary rooms for the storage of supplies and apparatus.



Typical Ramp as Used in the Watsonville and Healdsburg High Schools
This Feature Has Won the Approval of Local Authorities

The rooms devoted to the teaching of domestic science, which have already been mentioned, are also unusually complete and besides the cooking room, pantry and dining room, include fitting and sewing rooms. In the cooking room the tables with tops of artificial stone, intended for the use of pupils, are placed about a hollow square, the instructor being in the center. Each pupil's table is provided with an individual gas stove. This cooking room is finished in white enamel and with its water heater, storage closets, cupboards, wash trays, sink, cooling closet and other items of equipment is complete with every detail which would ordinarily be found in a well planned kitchen. In the fitting and sewing rooms are lockers and exhibit cases, ironing boards, triplicate mirrors and divers other conveniences which aid in the effective teaching of the branches to which the rooms are devoted. The drawing room, which might perhaps be regarded as a part of the equipment for teaching domestic science, is fitted with exhibition cases and plate rail and has its walls covered with monk's cloth upon which to pin prints and drawings.

The woodwork throughout this school building, excepting where special finishes are required, is stained aluminum gray with a dull surface, and the walls are tinted.

By the use of specially designed windows it is possible to make every room an open air classroom. These windows are reversible for cleaning. Skylights are provided in north rooms so that sunlight can be

Elevation of the Healdsburg High School as It Will Appear with Pavilions at Either Side

View of Physical Laboratory, Watsonville High School

introduced for sanitary reasons and additional light be secured on dull days. Heating and ventilation are provided by a plenum system in which the air from outside is forced over air warmers and into each room, providing an eight-minute change of air throughout. The air entering the rooms is under automatic control so that the desired temperature may be maintained. Oil burning equipment for the heating system includes apparatus for using the cheapest grades of crude fuel oil. One detail of the equipment consists of a large sized steel oil storage tank which is buried under ground to insure safety but which can be readily filled by gravity from an oil supply tank wagon. From this storage tank the oil is supplied to the burners by a small electrically driven oil pump. Plumbing throughout is of a type calculated to resist hard wear, always to be expected in a school. All of the piping and valves connected with the toilets are centered in a utility chamber and are exposed for quick adjustment or repair. Floors in toilet rooms are of metal and concrete construction and fixtures are of porcelain. These rooms are vented by means of an electrically driven fan changing the air every ten minutes.

The illustrations and plans of the high school building at Healdsburg, the main part of which has been recently completed, exhibit a different but equally successful arrangement of a structure planned for a school of much the same nature but extending over a somewhat greater area. Here there will shortly be built pavilions at either side of the main building and joined to it by covered passageways. One of these pavilions is intended for the teaching of wood working with shops, forge rooms and garage below, while the other pavilion will accommodate the departments devoted to domestic science in its several forms. This school is also equipped with ramps to be used instead of the usual staircases and there is the same ample provision for chemical, biological and physical laboratories which characterizes the school at Watsonville. In this Healdsburg school the assembly room is planned to do duty also as a gymnasium, while directly beneath space in the basement is intended to be used for showers and dressing rooms. The architecture here is of the Spanish colonial type; reinforced concrete has been used for walls and floors and also for the ramps which here, as in the Watsonville High School, are covered with cork linoleum cemented to the concrete. The details of ornamentation about the main entrance are of terra cotta and the rest of the exterior ornament is of cast concrete.

In planning both of these school buildings the architect has made full provision for athletic fields and playgrounds. The Healdsburg School was erected in 1919 at a cost of $100,000 and the Watsonville School for the same amount one year earlier.

View of Chemical Laboratory, Watsonville High School

The Effect of Zoning upon Living Conditions*

By HERBERT S. SWAN

MUCH theorizing has been indulged in as to the benefit zoning might accomplish, but what good has it actually achieved? That is a question we city planners must answer soon, for if the time has not arrived it is rapidly arriving when our theories must be backed up with solid achievement or both we and our theories will stand discredited.

The time during which zoning has been in effect, even in the cities which were the first to adopt it, has been very brief; indeed, much too brief to permit us at this moment to make a precise appraisal as to its ultimate value in solving our planning problems. It is, however, interesting to note that experience is rapidly accumulating to justify the earlier promises—and among them some of the most extravagant promises—as to what zoning would accomplish. From my own personal observation, I can tell of instance after instance where zoning has proved, and is proving, of the utmost value in improving both the technique and the art of living.

Preventing the Spoiling of Residence Districts

In Yonkers, for instance, the zoning ordinance took effect upon the same day that the restrictions in one of the largest and finest home sections of the city expired. Here was no fatal interim between the time the covenants running with the land terminated and those imposed by law began to operate. Unscrupulous speculators, waiting to exploit the suburban character of the district by putting up parasitic buildings, did not get a chance to file their plans, with the result that building under the zoning ordinance went right on where it left off under the private restrictions.

In Newark there was one unrestricted vacant lot in the very heart of a highly restricted neighborhood. The owner of this plot could put his property to any use he chose—to building an apartment, factory, store or garage; adjoining owners could erect only one-family, detached houses. Neighboring property owners repeatedly attempted to enter into an agreement with the owner of this plot, with a view to having him bind himself in the same manner that they had already bound themselves, but he paid no heed to their entreaties. The result was that all development within a radius of several hundred feet of this plot was paralyzed—no one dared to build himself a home next to this plot so long as he didn't know to what use it would be put. With the adoption of zoning in Newark, this lot was subjected to practically the same regulations as governed adjoining lots. Property that was formerly unmarketable is now being developed and improved on all sides of the un-neighborly neighbor, who is now powerless to give practical effect to his threats of erecting an objectionable building.

Preserving Uniform Building Lines

The requirements as to uniform building lines in front of houses are proving their value every day in such communities as have established them. In Newark, the first city in the United States to adopt a comprehensive plan for such control, owners who have made excavations for their cellars before filing their plans have, on several occasions, been obliged to dig new cellars farther back on their lots in order to comply with the building lines observed by neighboring property owners.

A few months after the adoption of zoning in White Plains, a member of the city plan commission proposed to erect an accessory garage upon his property. As his lot had a small terrace in front, he intended to construct the garage by digging it into the bank in front of his house. Had he done so, the roof of the garage would have projected some 5 feet above the level of his front porch. The zoning regulations which he himself had helped to frame, however, prevented his disfiguring his own home. To his present great satisfaction, the garage had to be constructed in the rear of the house.

Permanency of Districts

A frequent remark heard in unzoned communities concerning zoning is that the regulations and districts constitute merely the expression of a pious wish; that they will endure only until somebody wants them changed, and that the provisions of the ordinance will be juggled to suit everybody's convenience. Experience affords no support to such statements. Regulations adopted after full public discussion and conference with property owners become so deeply rooted in the community that they can be changed only when such change is thoroughly justified. The first year or two is always bound to be the most trying to enforcing a zoning ordinance. The newness of the regulations, the conflict of opinion as to how different areas should have been restricted and the lack of any building carried out in accordance with the plan, all tend to make the first year or so a critical period. And yet in communities that have adopted zoning, the changes in districts have been remarkably few. During the first 16 months of its operation, there have been but five minor changes in the districts laid down by the Newark ordinance. During the first 10 months of the Yonkers ordinance, there has been but one. The districts in White Plains are all identically the same today as 11 months ago under the original ordinance and other instances might be cited where results have been about the same.

* An address delivered before the recent National Conference on City Planning, held at Pittsburgh.

Exclusion of Dwellings from Industrial Districts

But maintenance of the original zones has not been accomplished entirely without opposition. An excellent illustration of what pressure an administration will withstand to uphold unchanged a zoning plan is afforded in Newark. The Newark ordinance, it will be recalled, excludes residential buildings from the heavy industrial districts. The area so restricted consists of meadow land, largely salt marsh, developed with chemical plants, tanneries, shipways, foundries, railroad yards, etc., and embraces about one-fourth of the entire area within the city. As a heavy industrial district, this locality is unequaled in the metropolitan area —low, level ground, held in large tracts; deep water, transcontinental railroads; close proximity to a large consuming public and an unlimited supply of stable labor—all afford it an unexcelled opportunity for attracting establishments seeking sites uniquely situated with reference to efficient large-scale production. To allow it to be gridironed with a rectangular street system and subdivided into blocks 200 feet wide and 600 or 700 feet long, with the land developed in 25-foot units, would utterly destroy the most magnificent industrial opportunity ever possessed by a community. The welfare of the future residential development of the city also demanded the exclusion of dwellings from this area. Any houses erected in such an environment would have been predestined to become slums.

Half a year ago, a manufacturer appeared before the Board of Commissioners with a petition to have a small portion of the district transferred to a zone in which residences would be allowed so that he might construct 61 houses for workmen employed at his plant. The petition was promptly denied. In refusing to grant the request the city fathers pointed out that the tract in question was so situated that it had practically none of the social conveniences indispensable to residential occupancy, being more than a mile from any store, church, school or moving picture theater; that it possessed none of the public utilities, neither water, gas, streets, sewers nor trolleys, and that to provide these utilities would only squander the city's resources upon improvements which would in the long run prejudice the growth of the city by forcing industries into localities less favorably situated.

Through the exclusion of dwellings from industrial districts and the exclusion of factories from residence localities, zoning is being relied upon in Hoboken as one of the chief agencies in the development of an industrial terminal. This plan includes, among other things, the complete revision of the street system throughout one-fifth of the city's area, abolishing more than half of the existing thoroughfares, widening others and laying out new streets. The plans for this area call for an industrial terminal equipped with facilities of direct rail shipment by every railroad, direct shipment by water from the docks immediately in the neighborhood, cheap power from a central station, and warehouses and factories erected to accommodate either single tenants or groups of tenants, with railway tracks connecting not only all the factories with one another but the piers and the classification yard and through the latter with the several trunk lines. Without zoning, it is questionable whether this plan could even be considered.

Percentage of Lot Area Occupied by Building

The provision limiting the percentage of lots which buildings may occupy is accompanied with so many benefits to the community, direct and indirect, that one can hardly suppress an exclamation of surprise when a long-time member of the conference waves it aside with a remark that it is "entirely superfluous," and that it "secures little if any extra advantage while it considerably increases the difficulty of applying the ordinance." Following out this theory, the zoning ordinance prepared by this member relies exclusively upon the provisions limiting the heights and regulating the sizes of courts and yards in restricting the bulk of buildings. So long as buildings conform to these general requirements they may occupy any proportion of the lot areas their owners choose. Everybody certainly agrees to the proposition that a zoning ordinance should be stripped of all superfluous matter; that provisions securing no extra advantage should be eliminated, and that the control exercised over building development should be as simple and direct as possible. These are axiomatic considerations. Nobody would for a single moment question them. But we do wish our zoning regulations to be adequate to the needs of the situation.

Under the ordinance just mentioned the regulations permit buildings to occupy from 50 to 70 per cent of the lots even in the districts that are now improved with private houses situated on lots having a width of 50 feet and occupying but 20 and 25 per cent of the ground. Under zoning ordinances adopted by adjoining communities similar types of development are limited to 30 per cent of the lots. This zoning ordinance, however, permits two-story buildings on lots 30 and 35 feet wide, generally speaking, to occupy from 45 to 55 per cent of the lots; on lots 50 feet wide, between 50 and 60 per cent, and on lots 100 feet wide between 60 and 70 per cent. The only limitations preventing buildings from covering the entire lots are the requirements relating to yards—a side yard of a width varying between 4 and 6 feet on either side of the building, a rear yard and a front yard in the case of buildings on streets less than 80 feet wide.

Are our best residence districts entitled to no more protection than is afforded by such regulations? The suburban character of a neighborhood, it is safe to assert, can never be maintained if buildings are to cover from one-half to three-

quarters of the land. Requiring an open space of 8 or 12 feet in width between buildings is not in itself sufficient to maintain the amenities of one-family or two-family detached house districts. Additional space must be kept open, else the only distinction between our tenement districts and our home districts will be in the heights of buildings and the kind—not the amount of open space surrounding buildings. Far from being "superfluous," the provision limiting the proportion of lot areas which buildings may occupy is one of the most useful in our zoning ordinances. It affords additional light and air; it promotes family privacy; it encourages the maintenance of lawns with grass and trees; it provides additional play spaces for children, off of dangerous traffic streets, and it segregates homogeneous types of buildings.

For five years past I have at every opportunity, in and out of season, at the risk of being considered a crank, urged the necessity of limiting the ever-increasing congestion of population in our cities. When the New York ordinance was in its formative stages, I worked for the adoption of a provision limiting the number of families that might be housed to the acre. At that time, however, such a measure was considered too advanced to be taken seriously. Three years later, however, in framing the Newark regulations, I succeeded in having this provision incorporated in the ordinance, this being the first time that such a provision had ever been adopted in the United States, though Yonkers, White Plains, Cliffside Park, Glen Ridge and Montclair were soon to follow with similar regulations.

The over-development of a small percentage of a city's area may result in a few owners waxing rich, but their "hogging" the land and capitalizing congestion also results in making slaves of many more, saddling them with increased taxes and assessments and depriving them for years and perhaps forever from deriving any revenue from their property. Because a building houses 50 families, it does not necessarily follow that there are builders anxious to buy all the vacant plots in the neighborhood with a view of erecting 50-family houses on them. The contrary is more apt to be true. The fact that a 50-family house has been built where only a 25-family house should have been erected has the effect of causing other lots to remain vacant when they might otherwise have been improved, and of holding in abeyance the effective demand for them until the increased population again warrants the erection of a large multi-family house.

Objection has been raised to limiting the number of familes to the acre on the score that reducing the density of population will require the subdivision and improvement of a larger superficial land area. The less densely people are housed, the greater undoubtedly will be the actual length of the streets and the extent of public utilities required to serve them. But it is not to be expected that the cost of land per family will increase at all in the same proportion as the diminution in the number of families to the acre. The economies obtainable through narrower streets and lighter pavements, possible with a sparser population, go a long way—if not the whole way—in offsetting the greater length of roadways, sewers, etc., necessary to develop the land. The aggregate increment in values throughout a city will not be lessened by limiting in a reasonable manner the number of families that may be housed on a given unit of land. On the contrary, it will be increased, given a broader base and made more stable. And who would deny that, viewed in every way, it is more desirable that this increment should be shared by a large number of owners than by a mere handful?

There are persons who believe regulations directly limiting congestion of population to be superfluous, just as there are persons who believe provisions restricting the percentage of lots that buildings may occupy to be unnecessary, but the method is commending itself to an increasing number of cities,—Mr. Bartholomew having obtained its adoption in Evanston, Ill., Mr. Whitten in Lakewood, Ohio, and Mr. Comey in Milwaukee.

Suburban Zoning

In the past our states have hesitated and delayed in passing welfare legislation on the ground that the enactment of laws relating to shorter hours of labor, the abolishment of child labor, the provision of old age pensions, compensation for industrial accidents, etc., would result in a situation where the state maintaining the lowest standards would enjoy such superior advantages in competitive markets as to make the adoption of such laws nothing short of disastrous to local industry. Whether this contention has or has not been borne out by experience is somewhat outside the scope of the present discussion, except insofar as it relates to the enactment of zoning regulations. Strange to say, when it comes to zoning this objection has never been raised; on the contrary, the general impression seems to prevail, and very justifiably so, too, that the unzoned community is at a very serious disadvantage as compared with the community that has adopted a zoning ordinance. Especially is this so in the cases of metropolitan areas with numerous suburbs.

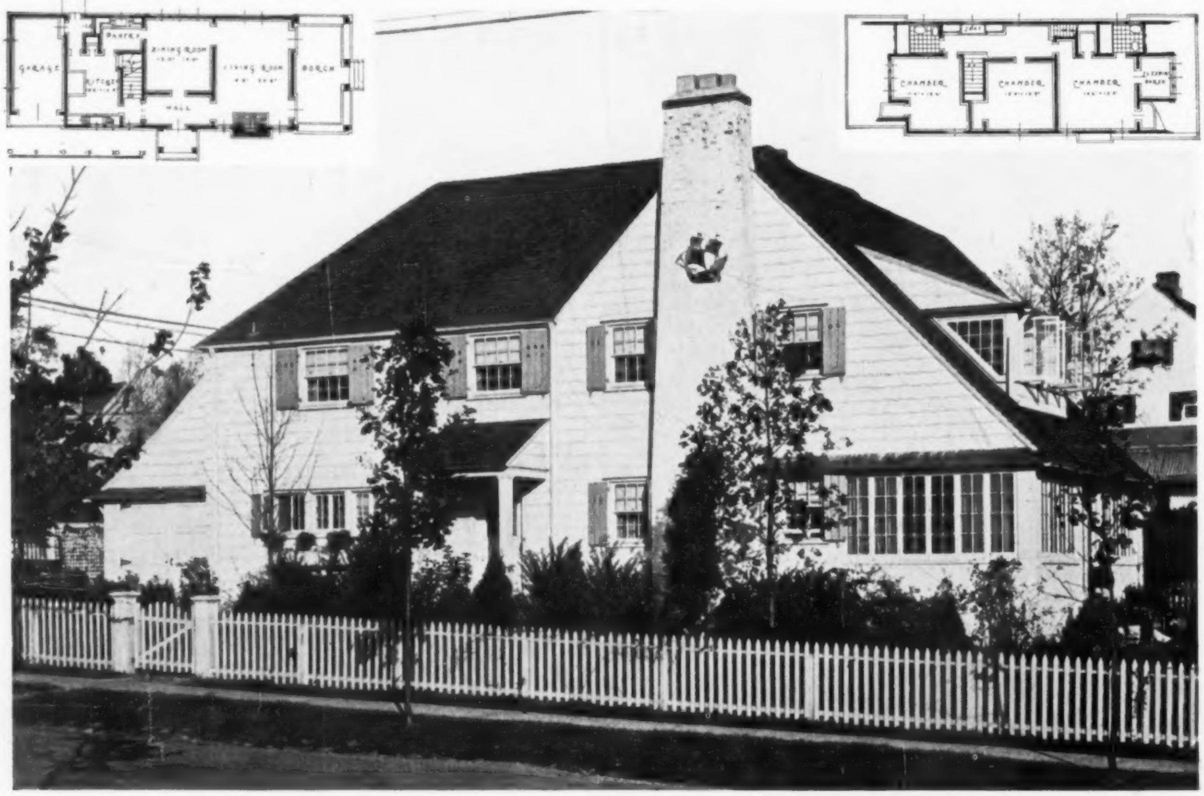
In such instances, the prospective home buyer is more and more often asking himself the question, "Why should I buy my home in an unzoned town, where my house may at any moment be flanked with apartments, factories or garages and its value seriously impaired, when for the same price I can buy just as good a house in a town that thinks enough of its homes to protect them with the strong arm of the law against injurious neighbors?" The mortgage lender, too, is with increasing frequency asking himself, "Why should I lend my money on property which may at any time have its value so depreciated through the construction of objectionable neighboring buildings that I may be forced to institute foreclosure proceedings and buy the property myself in order to protect my equity,

when in an adjoining suburb I can invest my money in real estate mortgages with the community itself guaranteeing the value of the property, as it were, against premature depreciation through precipitate and unwarranted changes in the building's environment by preventing the intrusion of undesirable development in the neighborhood?"

The practical effect of these considerations is most interesting. The zoned localities are not only absorbing the better grade of developments at the expense of the unzoned suburbs, but they are forcing the undesirable types of development into the unzoned towns. The builders, architects and real estate owners in unzoned towns are with increasing persistence urging their councils to adopt zoning so that they may have as good a sales proposition to make to prospective clients as competing builders, architects and real estate owners in zoned towns. An occasional sale lost now and then to a rival in a zoned suburb and the increasing reluctance on the part of lending interests to make loans on unprotected property—or if making loans, their discrimination in favor of protected localities with reference to both the interest rate charged and the amount loaned—considerations like these are proving more powerful than words in actually stirring unzoned towns to action.

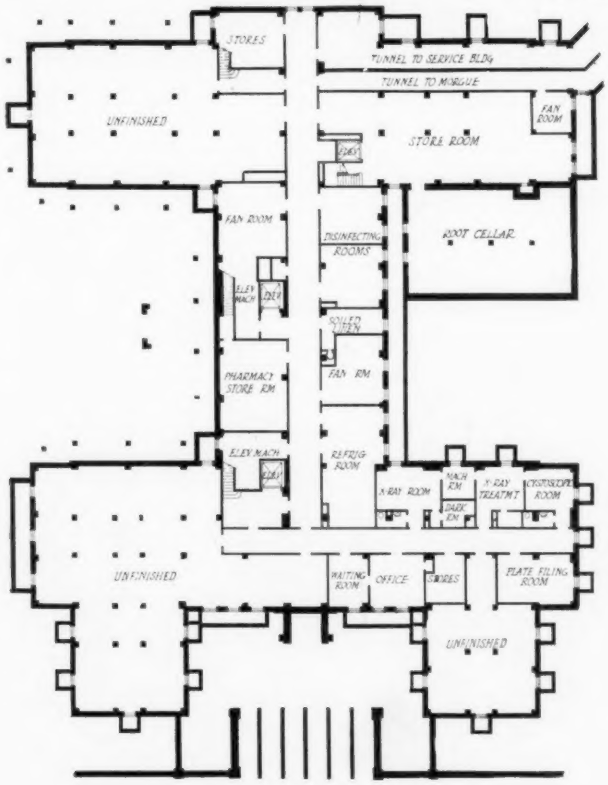
Though these communities have done nothing to adopt zoning, it is not quite exact to say that they are unzoned. The adoption of zoning by neighboring communities has in a sense already zoned them. Without their knowing it, they have been placed, as it were, in the position of unrestricted districts to their neighbors. Though they themselves may not have moved, their neighbors have. Today, therefore, they are not at all in the position they were in years ago when building was unregulated everywhere. Then, due to the universal lack of control, they stood on a par with their neighbors—ownership of property within their boundaries was accompanied by neither privileges nor handicaps not accompanying it elsewhere. But now this has all been changed. The fact that property is protected elsewhere makes its ownership in those places more desirable; that it is not protected here makes its ownership locally less attractive. To permit our neighbors' garages and factories to locate indiscriminately in our residence districts, while they exclude ours, can have but one result—it destroys the marketability of our residence property at the same time that it makes our competitors' more salable.

Zoning is both a positive and a negative factor in the development of a community—it encourages superior types of development; it discourages inferior types of development. Its mandatory provisions oblige things to be done which otherwise would not be done; inhibitions prevent things from being done which would otherwise be done. It stimulates, checks, guides—all to the benefit and lasting good of the community and this benefit will become increasingly apparent with the passing years.



House at Bronxville, New York. Julius Gregory, Architect

GENERAL VIEW

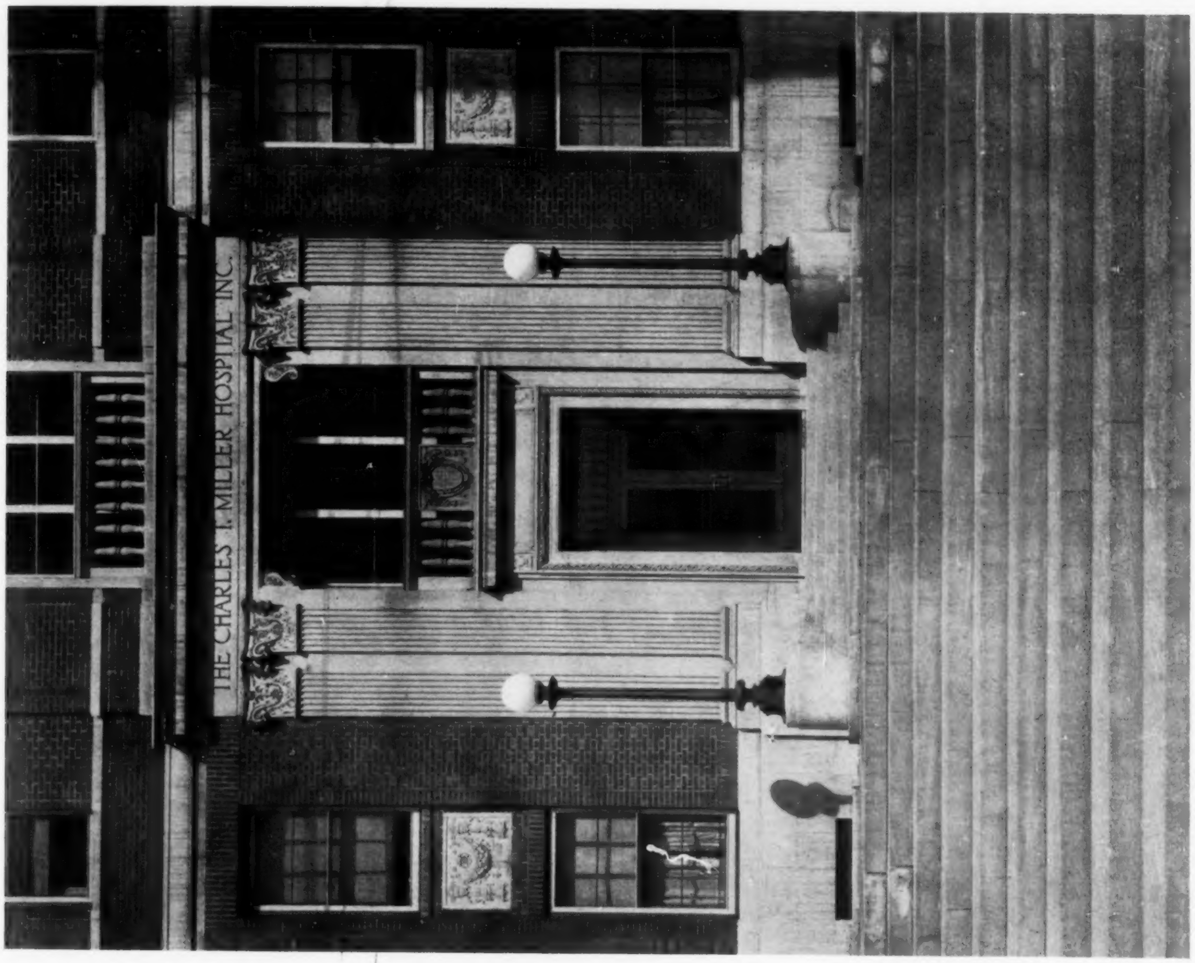


BASEMENT FLOOR PLAN

GROUND FLOOR PLAN

THE CHARLES T MILLER HOSPITAL, ST PAUL, MINN

C. H JOHNSTON, ARCHITECT



DETAIL OF ENTRANCE

FOURTH FLOOR PLAN

TYPICAL FLOOR PLAN

THE CHARLES T. MILLER HOSPITAL, ST. PAUL, MINN.

C. H. JOHNSTON, ARCHITECT

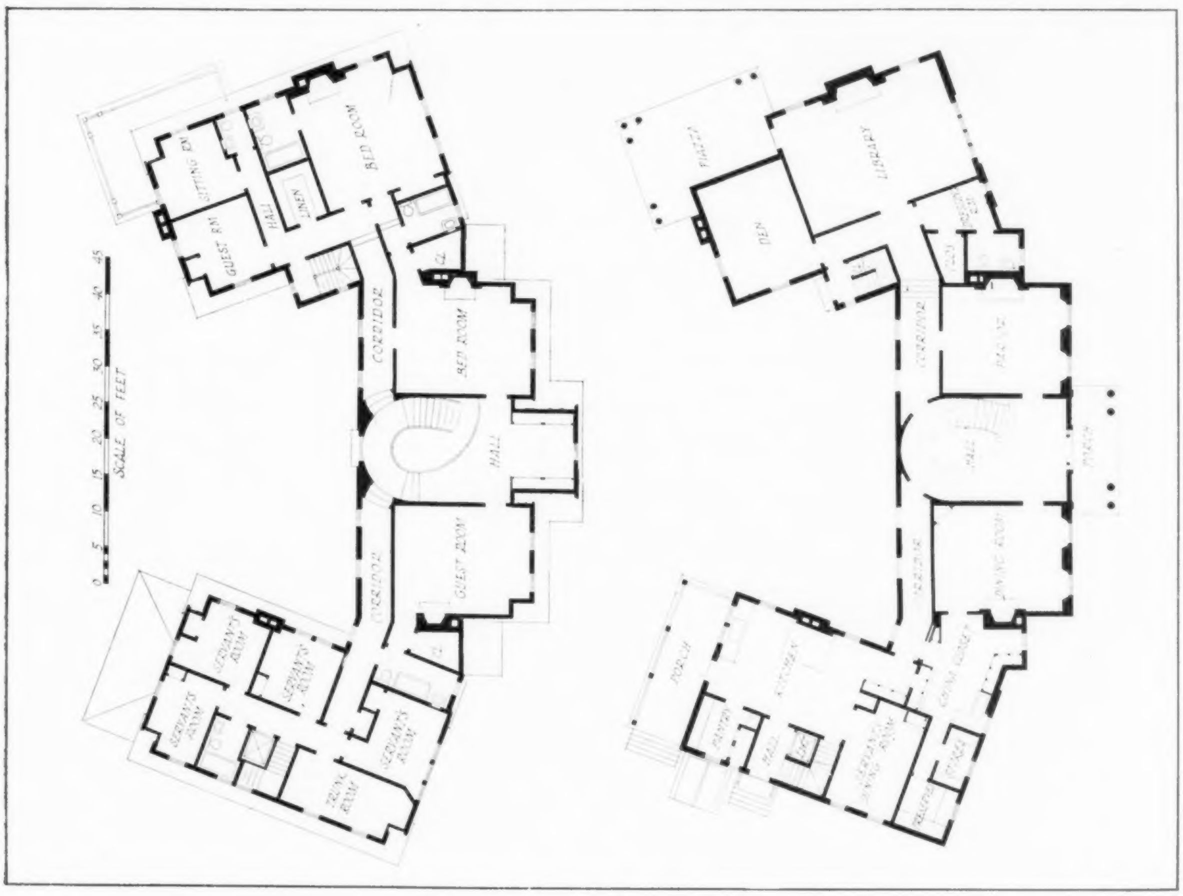

HOUSE FROM THE LAWN


VIEW FROM THE ROAD

HOUSE OF FRANCIS L COOLIDGE, ESQ., MILTON, MASS

GEORGE F SHEPARD, ARCHITECT

DETAIL OF STAIRWAY



FIRST AND SECOND FLOOR PLANS

HOUSE OF FRANCIS L. COOLIDGE, ESQ., MILTON, MASS

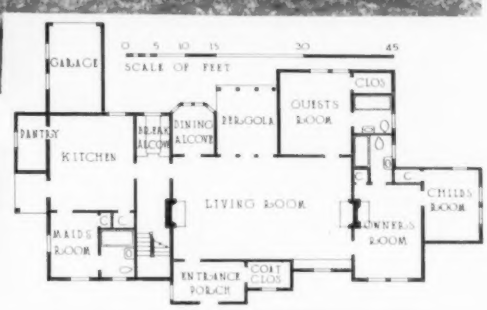
GEORGE F. SHEPARD, ARCHITECT

DINING ROOM

LIBRARY

HOUSE OF FRANCIS L. COOLIDGE, ESQ., MILTON, MASS

GEORGE F SHEPARD, ARCHITECT



HOUSE OF PAUL SHIELDS, ESQ., GREAT NECK, LONG ISLAND, N. Y.

CHESTER A. PATTERSON, ARCHITECT

The Prevention of Heat Losses

By WHARTON CLAY

HEAT loss through exterior walls has long been taken as a matter of course by architects, builders and owners alike, so there is much room for investigation and a crying need for prompt application of such lessons as have already been taught by scientific discovery. When one realizes that it has been proved from actual tests that there is a difference of 221% in the heat insulation properties of two widely used materials for exterior walls, together with a relatively similar difference in coal bills, it is apparent that accurate information is needed by the profession and that study of the subject will richly reward the architect who considers the economic as well as the artistic interests of his clients.

The lack of information regarding loss of heat through exterior walls is well illustrated by the statement of John R. Allen, in reporting on the research work of the American Society of Heating and Ventilating Engineers, that more coal is used per room in Texas and Georgia than in North and South Dakota. These latter states have given more consideration to efficient methods of insulating exterior walls. Many tests of thermal conductivity have been made in the past, but they have been largely concerned with either walls for refrigeration purposes or pipe covering, or else they have compared the specific values of different types of insulation. Hence, an elaborate series of tests on full sized models of common exterior walls, using common building paper in several different ways, brings the series "down to brass tacks," as the results can be applied directly in ordinary, everyday practice.

The basic principles of heat insulation must be fully understood in order that certain popular misconceptions may be avoided. If we turn to any school book on physics we will find there is no such thing as "cold"; it is merely the "absence of heat." Heat is a form of energy which comes from friction, and from chemical combinations producing what is commonly known as combustion.

Heat travels by three distinct and different modes—conduction, radiation and convection—and regarding each a brief explanation should be given.

1. Conduction. This may be illustrated with a teaspoon or the handle of a coffee pot. Heat travels through hard bodies such as metals and earthenware more easily than through wood, paper or fabrics. That is why we use metal and earthenware cooking utensils and stoves—because we want the heat on one side to quickly and easily travel through the material to the other side. But if we want to insulate the heat—in a flatiron, for instance, or a tea pot—we put a wooden handle on it. Part of the heat of a building escapes by conduction and we must use slow conductors in the wall to save the loss in this manner. Wood studs in the exterior walls are excellent for this purpose as they combine both strength and non-conductivity. Earthenware and metals, being rapid conductors of heat, should be avoided when so placed that any part forms a continuous bridge through a wall. A sure loss of heat by conduction will result, unless a radically different method is used.

2. Radiation is the second method of heat transference and is the process by which heat waves are carried through space. When one stands before an open grate the heat travels to one by radiation. Thus the name of the steam radiator is derived, because the heat of the steam, passing readily through the thin metal shell by conduction, is radiated in all directions. This action has little value in construction, and any difference that occurs in this manner is due to the texture and color of the exterior and varies with weather conditions. A smooth surface, being less radiating than a rough, and a white surface less radiating than a black, the difference is the same for the same color or texture of surface, regardless of the internal construction of the wall itself.

3. Convection, therefore, is last but in many respects the most important form of transference, especially in all types of hollow walls. Surely it is the form least generally understood. This is the method of transfer of heat which is exercised when air is heated; it rises because of its lighter weight; comes in contact with a colder surface; loses its heat; falls, due to its greater weight when cooled, and when it is again heated, rises to repeat the process of circulation. It is this circulation of the heated air which warms a house from a furnace or makes the upper part of a room warmer than the part near the floor.

The application of convection to hollow walls comes, therefore, in the effect of the air currents within the hollow spaces. The popularly styled "dead air space" is a fine insulation—*if it is "dead"!* But if it is "live," that is, wide enough to permit circulation, the "air space" is the worst thing possible, as this moving air is a splendid means for assisting the inside heat to escape to the outside shell of the hollow wall. The effect of the size of the air space is illustrated by a swarm of flies in a large cage in which they have room to fly around—live air space; but bring the walls close together and they will be confined and held in place—that is the dead air.

As the effect of walls upon passage of heat has heretofore been carefully studied chiefly in relation to cold storage and refrigeration, let us turn to the *Journal of the American Society of Refrigerating Engineers* to see what effect the width of air space has, and how narrow such hollows must be in order to be "dead" and therefore a benefit rather than

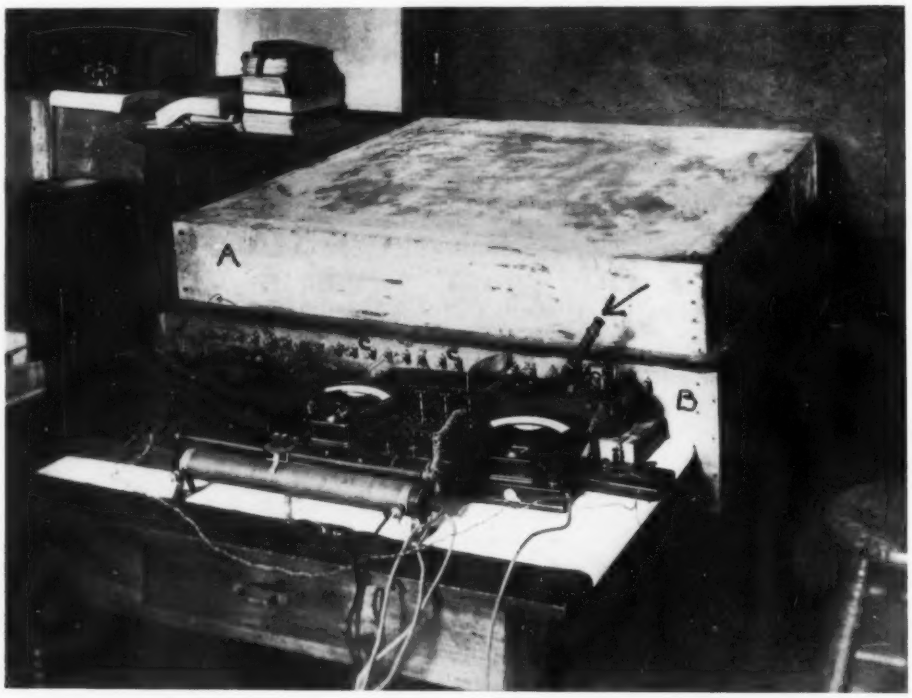


Fig. 1. Layout for thermal conductivity tests, showing sample (A) on insulated box (B), with electrical connections for thermo couples. Arrow points to reading microscope

as shown by some of our experiments, that a vertical wall made up of two ⅜-inch air spaces, with paper to separate them, gives about the conduction of a similar thickness of cork board."

Or, to quote Prof. J. C. Peebles, of Armour Institute of Technology: "For a given height of air space there is a critical thickness beyond which thermal resistance becomes less and not more. For a height of 8 inches this critical thickness is about ½ inch, while for a height of 2 feet the critical thickness is in the neighborhood of 1 inch."

They then continue to show that the air can be confined, even with paper. But a correct view must be taken, *i.e.*, different from many preconceived notions. Air spaces are not valuable unless of such narrowness that convection is entirely eliminated.

This will suffice for the abstract theory. Let us now describe the exhaustive tests made by Prof. G. F. Gebhardt and Prof. Peebles at Armour Institute of Technology, and analyze them in the light of the scientific reasons for the showings made by the various spaces.

The research was begun to learn the relative value of the metal lath and stucco wall on wood studs to that of other standard fire-resistive walls generally used for stucco. Although it was found that the plain back-plastered wall ranked very high as an insulator and was superior to those which popularly are accorded higher position, the re-

an actual detriment to insulation. Air itself is a good insulator but it must be so confined that it will not circulate and actually aid in heat loss by carrying the heat of the inside to the outside—"convection."

Under the subject "Testing Thermal Insulators," Dickinson and Van Dusen, of the United States Bureau of Standards, say: "Heat is transmitted from one surface to the other by radiation, air conduction or convection. Convection and conduction are, in the case of vertical air spaces, inextricably connected. Convection depends upon the width of a space, its height and the temperature difference between the boundaries." In comparing one type of wall with another this temperature difference should be figured as the same, because the difference between the outdoor atmosphere and a room at comfortable temperature would be the same if any type of wall were used.

"Important variations of the apparent conduction through air spaces occur with change of width, *although it has often been assumed* that all air spaces have about the same conduction. To represent these changes adequately, a very large number of observations have been made with air spaces of many different widths from 1/16 inch to 3 inches.

"For very narrow spaces, *i.e.*, less than 1 cm. (⅜ inch), the *resistance* to the passage of heat increases almost in proportion to the thickness. Beyond this the resistance increases less rapidly until it reaches a maximum beyond which a *greater* thickness offers *less* resistance to the passage of heat.

"Plain convection plays no appreciable part in the conduction of air spaces of less than ⅜-inch width when 8 inches high. It is a fact, however,

RESULT OF TESTS SHOWING HEAT LOSS CALCULATIONS

Sample No	Base B.t.u. Loss	% added for Flues	B.t.u. Loss when in Vertical Position
1	.31	7½	.333
2	.323	7½	.347
3	.394	7½	.4235
4	.418	7½	.449
5	.413	10	.454
6	.422	7½	.454
7	.510	7½	.548
8	.557	0	.557
9	.510	10	.561
10	.510	15	.586
11	.626	10	.689
12	.508	10	.559
13	.626	15	.719
14	.508	15	.584
15	.642	10	.706
16	.642	15	.738

Fig. 2

search was continued to include various methods of inexpensive extra insulation that are possible of incorporation in the hollow section of the metal lath wall while it is being constructed. The constant heat loss, winter after winter, that is incurred through lack of accurate information is appalling and the information derived from this series of tests, if utilized, can be made to save hundreds of thousands of dollars yearly.

The tests were made on full sized samples of the ordinary run of materials, purchased in the open market. They were all erected in accordance with common trade practice by mechanics in the respective trades and under the supervision of Prof. Peebles and a capable contractor. The stucco was made with Portland cement, and wherever furring or lathing was used on the interior it was always with the same kind of metal lath and with the same thickness of hard wall plaster so that no variation in results could occur on this account. The method of testing was to lay each sample (42 inches square) in turn upon a carefully insulated box which contained a series of electrical heating coils. This is illustrated in Fig. 1.

The entire construction was installed in a room of constant temperature. An electrical current was sent into the coils to produce a temperature of 68° difference between the box and the room,—that is from one side to the other of the wall section. This difference was chosen as representing the same heat difference between a room at 68° and at zero outdoors—the maximum continuous difference in the Northern states and frequently used by heating engineers. This electrical current was measured by instruments and adjusted until the heat difference of 68° was maintained for many hours without necessity of varying the current. The necessary electrical energy in-put represented exactly the heat that was being constantly lost through the wall. This was then reduced to British thermal units (B.t.u.) and then to B.t.u. per square foot of wall, per degree difference in temperature, per

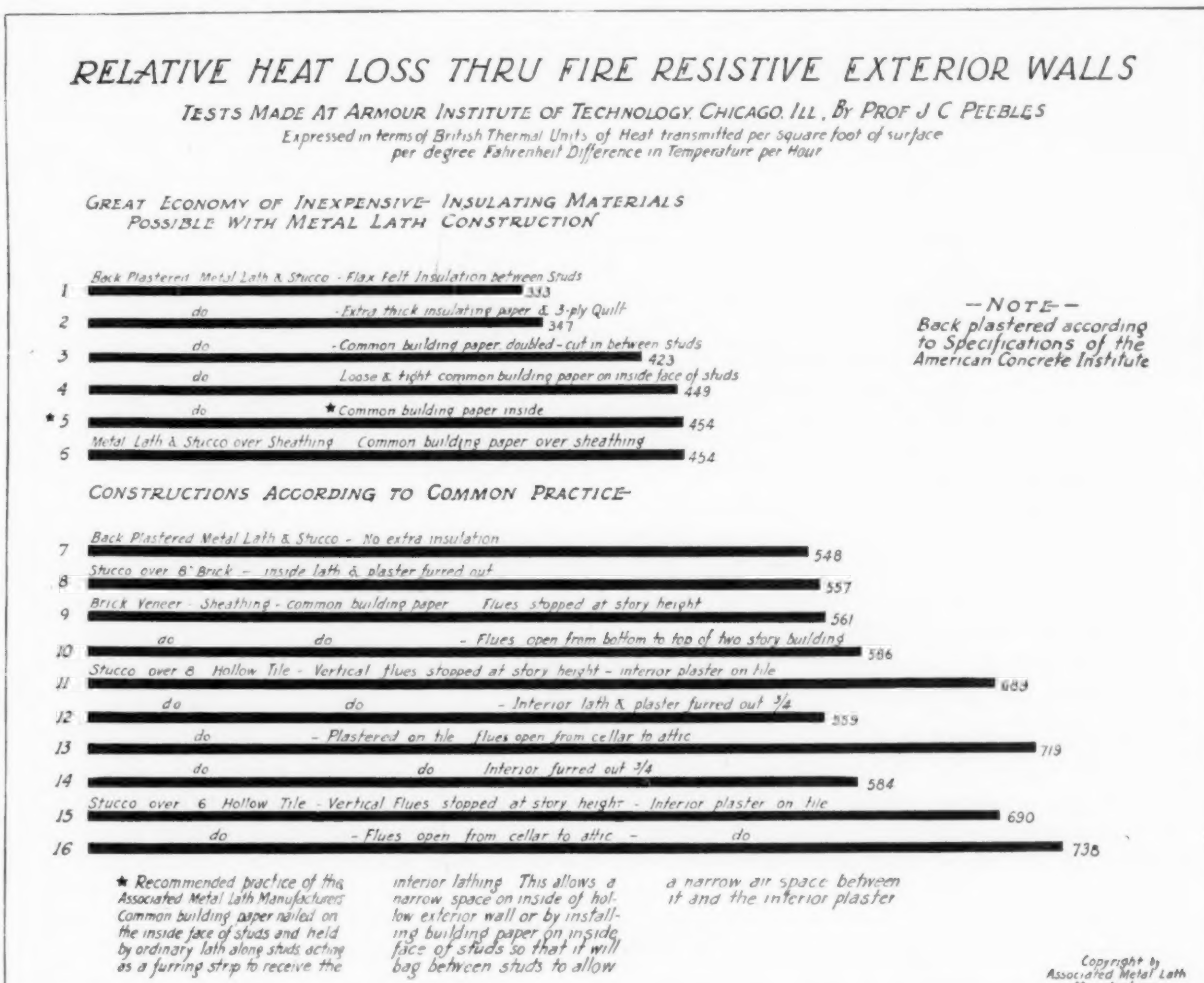


Fig. 3

hour—the time unit upon which all American heating formulæ are based. All samples were similarly tested and recorded for comparison. (See Fig. 2.)

"In discussing these tests which we have made," writes Prof. Peebles, "it seems that the following points may well be emphasized: These figures are not the result of estimates or computations but were obtained from careful experiments, conducted on full sized sections. The circumstances of the tests were such that conditions could be maintained constant throughout. The work was done by experienced investigators who have no interest other than arriving at the facts in the case; therefore, the results must be accepted as a conscientious effort to obtain correct relative figures on the conductivities of the various examples. (See Fig. 3.)

"And now in regard to the conductivity of glass as compared to these walls. Many people seem to have the idea that glass is not a particularly good insulator and that the chief reason it is used in windows is because of its transparency. As a matter of fact, this is far from being the case, as glass is an excellent insulator both thermally and electrically. If this were not the case it would be next to impossible to heat a building having a large proportion of glass surface. Most people familiar with the subject will concede that pure cork board is a good insulator and yet, thickness for thickness, glass is nearly three times as good."

It is well known that overcoating a house with metal lath and Portland cement stucco creates a narrow air space between the overcoating and the original wood siding of the building. Prof. Peebles' tests show that this reduces the conductivity of the exterior wall by 15 7/10%, with a corresponding decrease in the coal bill. This decrease in the coal bill will be approximately 13 3/10% because the wall area takes up about 85% of the total exposure. This 13 3/10% saving is more than enough to pay the interest on the cost of overcoating any house.

Here let it be said that never before has such an exhaustive series of tests been reported and that many of the constants now in use are based upon calculations, or estimated from tests of component parts such as brick, wood, plaster, etc., and must be revised in the light of these tests upon actual construction examples. Even Prof. Peebles writes concerning a quotation from one of his works made prior to these experiments: "The figures given (previously) were the results of estimates only. You are no doubt well aware that there are certain formulæ which the heating engineer uses. . . . However, when these figures were submitted we had conducted no tests upon an 8-inch brick wall. . . . Results quoted (previously) were substantially those obtained from the theoretical formulæ (in present use), and our later experiences in making these tests show that the results were too low. There is no doubt that the same is true for a good many other values for estimated heat flow."

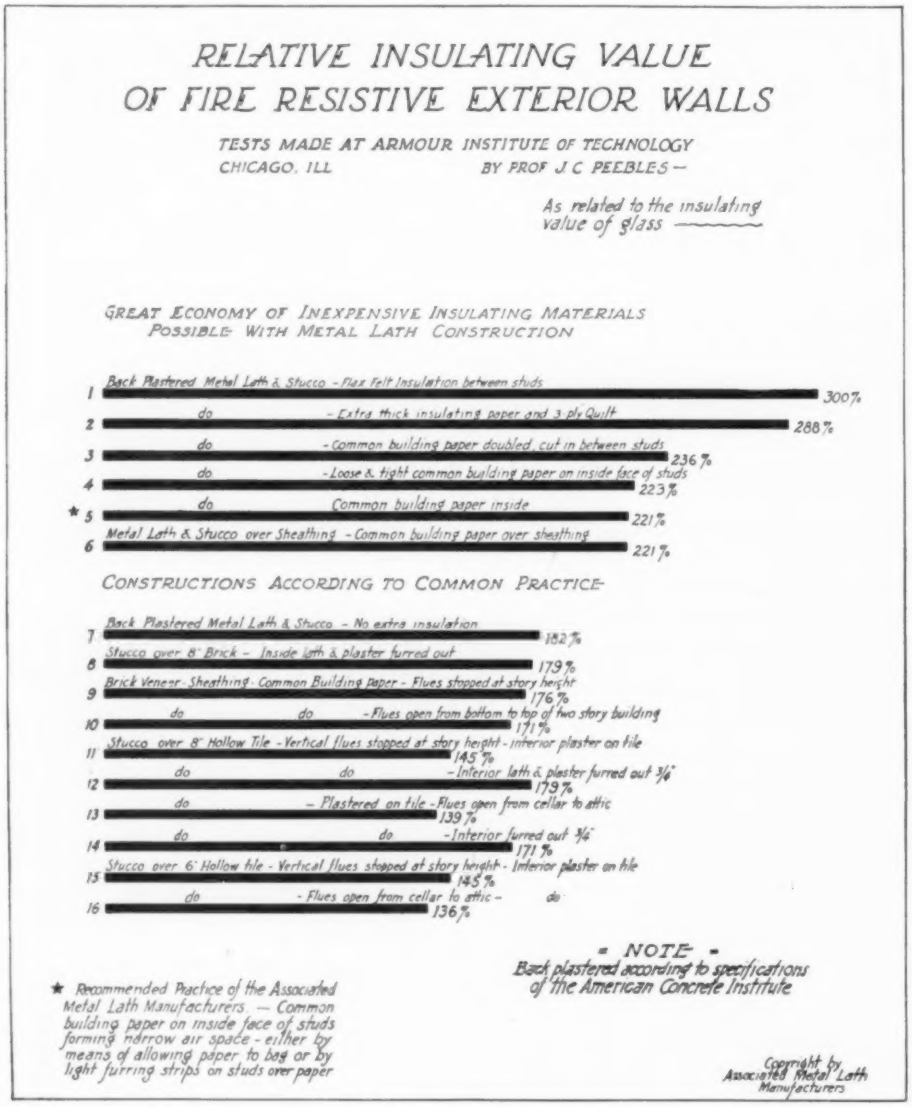


Fig. 4

Every facility for scientific accuracy was given in making these tests and they represent the last word on the subject. They extended over a period of two years and tests were frequently repeated with variations of 2%, but accuracy of about 5% is guaranteed.

"We have neglected the effect of wind on an exposed wall surface, a factor which is difficult to reproduce accurately in an experimental investigation. It is a fact well known to every engineer that even a solid brick wall is porous and permits considerable infiltration of air. This causes an appreciable increase in the conductivity in a wall of such construction. The use, however, of building paper or similar material eliminates this weakness to a considerable extent. The heat insulating properties of paper can be readily utilized in back-plastered stucco construction."

All tests were made, for convenience, in the horizontal position, but enough were made in both horizontal and vertical to correct the readings for vertical positions, and this is the way they are given herewith.

"Any increase in heat flow from conductivity," says Prof. Peebles, "will affect all of the hollow wall types, depending upon the vertical dimension of the air space. Where this distance is approximately 9 feet from floor to ceiling, the increase in heat flow would probably be about 10% over that shown in our tests. If, however, this distance is stopped by a horizontal bracing, which we understand is the recommended practice of the American Concrete Institute and the Associated Metal Lath Manufacturers for back-plastered stucco construction, the increase would probably not exceed 7 or 8%. On the other hand, in certain cases of hollow tile construction with vertical webs (or hollow brick walls) this air space may extend from foundation to attic, in which case the increase may be as much as 15% or more. A better practice would be to use a joist support in which case the vertical flue would be reduced to about 9 feet in height and the increase in heat flow to about 10%.

"The recommended practice of the Associated Metal Lath Manufacturers of laying a strip of metal lath covered with a layer of mortar in every horizontal course of hollow tile will reduce the vertical distance to about 12 inches. In such construction there would probably be but little increase in thermal conductivity over those shown by our tests."

The tiles tested by Prof. Peebles had a single set of cells from face to face in the 6-inch size and a double set in the 8-inch size. In other words, there was no web parallel to the face of the wall in the 6-inch, but there was a web parallel to the wall in the 8-inch tile. The air space in the 8-inch tile, therefore, has two advantages over the 6-inch tile; one is that the air space is narrower, and therefore less convection can set up; the other is that there are two air spaces and therefore the convection set up in air space No. 2 is only affected by

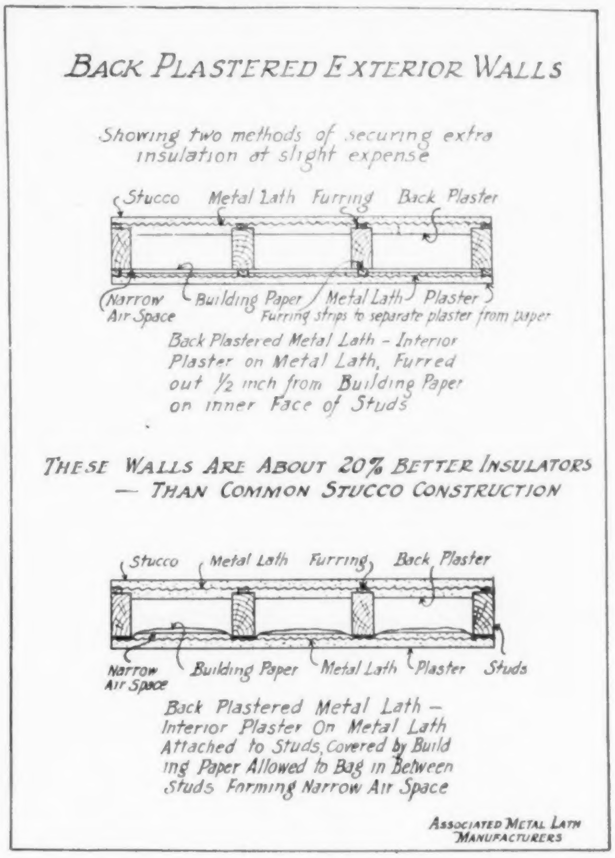


Fig. 5

the temperature of the interior web and not by the temperature of the exterior web. Thus, there are two good reasons why the 8-inch tile is better than the 6-inch.

"The temperature differences used in these tests averaged about 68° Fahr., which is near the maximum for this latitude.

"True thermal conductivity through solid portions of the wall is practically proportional to the temperature difference, but the effect of air circulation in hollow wall increases more rapidly than the temperature difference. It therefore becomes a much more important factor, relatively, at a temperature difference of 68°, say, than it would be at 38°, which is near the mean temperature difference for this latitude.

"The effect of internal air circulation on heat flow is considerably increased if, through structural imperfections, the external air is allowed access to the interior of the wall. It is important, therefore, that the structure be tight and free from cracks, especially at the bottom of the wall."

These different points must be kept constantly in mind to correct preconceived erroneous notions:

1. Heat is transferred in three ways—by conduction, radiation and convection.
2. The loss by simple conduction is chiefly through those members which extend from side to side of the hollow example, such as wood studs or tile webs, and in the solid examples by the entire mass. The loss by this method is proportional as the webs or studs are good or bad conductors. The loss through the shell, such as the stucco in

back-plastered type, or through the faces of tile, is small and about equal.

3. The loss by convection is very serious, and is frequently neglected, as the Bureau of Standards authorities note.
4. There are air spaces which insulate and others which are not as valuable as if solid. The value of different sized air spaces is well illustrated in the case of hollow tile where the large air spaces of the tile wall, when unfurred, show great heat loss, but when furred—producing a small air space between the plaster and tile—the heat loss is brought down to the range of other standard walls. This amply justifies the use of furring on the inside of 6- and 8-inch hollow tile walls, and the preference for one or more dividing webs parallel to the face of the tile.
5. The height of the channel or flue has great importance, if wider than 1 inch. This is well known in connection with chimney construction—the higher the chimney, the greater the movement or draft. Cut down the flue height.
6. If the flue extends from cellar to attic the increased heat loss is proportionally 15%; if stopped off at floor level the increase is 10%; if midway between floor and ceiling, 7½%.
7. The material used in dividing the wall into air spaces is of little consequence, ordinary building paper proving to be one of the best materials when properly placed so that the air spaces are narrow. This is illustrated again by the furring, as the thin plaster is of no great insulating value in itself, unless it acts to confine air in a narrow space.
8. Advantage of the extra insulation of especially manufactured insulating materials can be taken when the walls are hollow, as in the wood frame protected by stucco reinforced with metal lath.

Therefore, to sum up: Exterior walls should be designed for efficiency, like any other structural unit. Wood-studded stucco walls, even without extra insulation, are very efficient, but by the inexpensive device of creating a narrow, 1-inch air space, extra insulation is greatly increased.

This can be accomplished cheaply by either of two methods: (1) Placing common building paper over the inside face of the studs; either nailing ordinary lath over the paper along the studs to act as furring for the interior lath, or (2) installing the paper loosely, allowing the paper to bag into the hollow space, placing the interior lath directly on the paper-covered studs.

How to Use New Figures

Fig. 3 represents the heat loss through exterior walls and it will be noted that the common practices for stucco construction are very close when furring is used on the walls. However, the opportunity of using extra insulation should be taken advantage of more frequently. There is over 200% difference between the heat lost through the back-plastered wall with the flax felt between the studs, and that lost by some of the other standard constructions not susceptible to extra insulation. This is all loss and goes on year after year.

Fig. 4 presents a more graphic illustration as it is given in terms of heat insulation, the best insulated wall being represented by the longest line, and that least insulated by the shortest line. The relation is given as compared with ordinary window glass, which by many experimenters has been recognized to be one B.t.u. per square foot per degree difference in temperature per hour. In other words, the lines represent the relative heat loss as compared with window glass as a base.

Fig. 5 shows the final results of the investigation and illustrates two methods of producing an air space of about 1 inch in back-plastered stucco construction at a minimum of expense. It represents a saving of 20% of heat loss over other common constructions of either hollow or solid masonry walls, and over 34% when masonry walls are not furred.

These rules for calculating heating are frequently used in the United States for a maximum of 80° difference in temperature:

1 foot of radiation for every 300 cubic feet of contents, plus

1 foot of radiation for every 15 square feet net exposed wall surface, plus

1 foot of radiation for every 2 square feet of single glass surface, plus

1 foot of radiation for every 30 square feet of ceiling area for all rooms with plastered ceilings and unheated air space between ceiling and the roof, plus additions for skylights, absence of attics and other incidentals.

These rough and ready rules are based upon ordinary construction with a loss of about .560 B.t.u. The principal reason these rules work out satisfactorily is that even the "careful" architect frequently adds 50% to the heat loss and lets it go at that. With Prof. Peebles' determinations, however, it is possible to substitute in the second part of the formula 1 square foot of radiation for every 12 square feet (instead of 15 square feet) net exposed wall surface, when back-plastered metal lath and stucco is used with building paper on the inside studs, or to substitute 8 9/10 square feet for the 15 square feet if the best insulation, shown in Fig. 2, is used.

Working this out for a large residence in Winnetka, Ill., recently completed, these figures are given:

Wall and exposed ceiling of the top floor	6,622 sq. ft.
Area of glass	1,389 " "
Total exposure	8,011 " "
According to the given rule of thumb there would be:	
1 sq. ft. of heating surface for 15 sq. ft. of wall and roof	440 sq. ft.
1 sq. ft. of heating surface for 12 sq. ft. of glass	695 " "
1 sq. ft. of heating surface for 300 cu. ft. of air	250 " "
Total radiation	1,385 " "
If the heat loss in the walls were cut in half by using the back-plastered construction with the best type of insulation, as against the ordinary, common practice for masonry and other walls tested, deduct	220 sq. ft.
Gross radiation by more scientific construction	1,165 " "
Or a reduction of 16%	
Saving on the cost of installation and cost of boiler, radiation, piping, etc.:—12% of the cost of $4,620	$554.00
Saving on the operation of steam plant in vicinity of Chicago: 3 tons of hard coal for 100 sq. ft. of radiation per heating season;—41½ tons at the present price of $15 per ton	$623.25
16% saving is equivalent to	$99.68 per year
This represents a continuous loss each year, or capitalized at 6%, represents the interest on	$1,670.00

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Steel Design for Buildings

PART III. THE DESIGN OF A PLATE GIRDER

By CHARLES L. SHEDD, C.E.

IN the June number of THE FORUM we discussed the general features of plate girder design. We give here the computations for the design of a single-plate girder which carries a column load of 309,700 pounds and a uniform load of 28,000 pounds on a span of 14 feet and 6 inches. The arrangement of figures for determining the re-

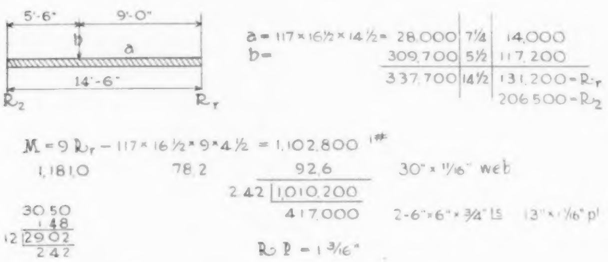


Diagram Showing Application of Figures

actions and bending moment is the same as for those described for beams in the July number.

The greatest reaction is 206,500 pounds which is the maximum shear. It is usual to allow 10,000 pounds per square inch in shear on the gross area of the web. Table I shows the gross areas for various sized webs. Along the top of the table are given various values for "t," the thickness of the web plate, varying by sixteenths of an inch from 5/16" to 7/8", and for various depths of web plate from 30" to 60", varying at intervals of 2". Plates are most easily obtainable in widths which are multiples of 2" although intermediate sizes are rolled. A few years ago it was the practice to use the net area of webs, but recent tests have given results which warrant engineers in the use of the gross areas with the usual spacing of rivets. In this case we have chosen a web plate 30"x11/16" which is good for 206,300, according to the table; this is only one-tenth of 1% less than required, which of course is near enough for practical purposes.

It is generally allowable to use one-eighth of the area of the web with the area of the flange in designing the flanges. Table II gives the values of the same webs as given in Table I for bending. It gives the product of one-eighth of the area of the web, 16,000, and the depth of the web less 3" which gives the moment of resistance of the web in foot-pounds. This is a little on the safe side in most cases as 3" is generally more than need be used, as will be seen by Table IV where it is described. The total moment on the girder is 1,102,800 foot-pounds and we can deduct from this the value of the web in bending which we find in Table II to be 92,600 foot-pounds, leaving 1,010,200 foot-pounds to be taken care of by the flange angles and cover plates.

If we assumed that the effective depth of the plate girder was 3" less than the depth of the web, or 27" which is 2.25 feet, we can divide the moment remaining by 2.25 on the slide rule to get the flange angles and plates approximately. This division on the slide rule gives about 450,000 as the total flange stress to be taken care of by the angles and cover plates. Table V gives the allowable flange stress for various sections. If we used 6" x 6" x ¾" angles the thickness of the 13" cover plates would be about 1¼". We can now correct the effective depth by using Table IV. This table gives the distances from the backs of the angles to the centers of gravity of the various flange sections. The effective depth required is the distance between these centers of gravity. The backs of flange angles are usually placed ½" further apart than the depth of the web plate and in this case would be 30.5". The trial

GROSS AREA OF WEBS										
d \ t	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8
30"	9.38	11,25	13,13	15.00	16,88	18,75	20.63	22,50	24.38	26,25
32"	10,00	12,00	14,00	16.00	18,00	20,00	22,00	24,00	26.00	28.00
34	10,63	12,75	14.88	17.00	19,13	21,25	23,38	25,50	27,63	29,75
36	11,25	13,50	15,75	18.00	20,25	22,50	24,75	27,00	29,25	31,50
38	11,88	14,25	16,63	19.00	21,38	23,75	26,13	28,50	30,88	33,25
40	12,50	15,00	17,50	20.00	22.50	25.00	27,50	30,00	32.50	35.00
42	13,13	15,75	18,38	21.00	23,63	26,25	28,88	31,50	34,13	36,75
44	13,75	16,50	19,25	22.00	24.75	27,50	30,25	33,00	35,75	38,50
46	14,38	17,25	20,13	23.00	25,88	28,75	31,63	34,50	37,38	40,25
48	15,00	18,00	21,00	24.00	27,00	30,00	33,00	36.00	39.00	42.00
50	15,63	18,75	21,88	25.00	28,13	31,25	34,38	37,50	40,63	43,75
52	16,25	19,50	22,75	26.00	29,25	32,50	35,75	39,00	42,25	44,50
54	16,88	20,25	23,63	27.00	30,38	33,75	37,13	40,50	43,88	47,25
56	17,50	21,00	24,50	28.00	31,50	35,00	38,50	42,00	45,50	49,00
58	18,13	21,75	25,38	29.00	32,63	36,25	39,88	43,50	47,13	50,75
60	18,75	22,50	26,25	30.00	33,75	37,50	41,25	45,00	48,75	52,50

Table I

section which we found gives in Table IV as the distance from the backs of the angles to the center of gravity of the trial flange section .60″ which, multiplied by 2 and deducted from 30.50, would give 29.3″ or 2.44 feet. If we adjust our slide rule so as to use this instead of 2.25 we find that $1\frac{1}{16}''$ cover plates could be used. We can correct the effective depth to check this section and find it to be 2.42 which gives a required flange stress of 417,000 pounds. In Table V the allowable flange stress for this section would be 419,400 pounds, which shows that our section is satisfactory.

	1/8 WEB × 16,000 × ((d−3)/12)										
d	(d−3)/12	t= 5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8
30	2.25	42,2	50,6	59,0	67,4	75,8	84,2	92,6	101,0	109,8	118,0
32	2.42	48,4	58,1	67,8	77,5	87,2	96,8	106,5	116,3	126,0	135,8
34	2.58	54,8	65,8	76,7	87,7	98,6	109,6	120,6	131,5	142,5	153,5
36	2.75	61,8	74,2	86,5	98,9	110,2	123,6	136,0	148,3	160,8	173,0
38	2.92	69,3	83,1	97,0	111,0	125,0	138,8	152,3	166,5	180,1	194,0
40	3.08	77,0	92,4	107,9	123,2	138,8	154,0	169,8	185,0	200,1	216,0
42	3.25	85,2	102,1	119,1	136,0	153,0	170,2	187,5	204,2	221,5	238,2
44	3.42	94,0	112,9	131,8	150,5	169,1	188,0	206,5	226,0	244,1	262,5
46	3.58	102,9	123,4	144,0	164,8	185,2	206,0	226,5	247,5	268,0	288,2
48	3.75	112,5	135,0	157,6	180,0	202,6	225,0	247,5	270,0	292,3	314,5
50	3.92	122,2	146,8	171,1	195,8	220,0	244,5	269,0	294,0	318,0	342,0
52	4.08	132,8	159,0	186,0	212,0	239,0	265,5	292,0	318,0	345,0	372,0
54	4.25	143,2	172,0	200,5	229,5	258,0	286,5	316,0	344,0	372,0	401,0
56	4.42	154,8	185,8	216,2	247,5	278,0	309,5	340,0	371,0	402,0	433,0
58	4.58	166,0	199,2	232,2	266,0	299,0	332,0	365,0	399,0	432,0	465,0
60	4.75	178,2	214,0	250,0	285,0	320,5	356,2	392,0	428,0	463,0	499,0

Table II

t=	5/16″	3/8″	7/16″	1/2″	9/16″	5/8″	d.s
3/4″φ	4,690	5,630	6,560	7,500	8,440	—	8,840

ALLOWABLE SHEARS FOR VARIOUS R P (d s.) 3/4″ RIVETS																			
EFF DEPTH	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	1 9/16	1 5/8	1 11/16	1 3/4	1 13/16	1 7/8	1 15/16	2	2 1/16	2 1/8	2 3/16	2 1/4
1.3	122,6	116,1	110,3	105,1	100,3	95,9	91,9	88,3	84,9	81,7	78,8	76,1	73,5	71,2	69,0	66,9	64,9	63,0	61,3
4	132,0	125,1	118,8	113,2	108,0	103,3	99,0	95,0	91,4	88,0	84,9	81,9	79,2	76,7	74,3	72,0	69,9	67,9	66,0
5	141,4	134,0	127,3	121,2	115,7	110,7	106,1	101,8	97,9	94,3	90,9	87,8	84,9	82,1	79,6	77,1	74,9	72,7	70,7
6	150,9	142,9	135,8	129,3	123,4	118,1	113,2	108,6	104,4	100,6	97,0	93,6	90,5	87,6	84,9	82,3	79,9	77,6	75,4
7	160,3	151,9	144,3	137,4	131,2	125,5	120,2	115,4	111,0	106,9	103,0	99,5	96,2	93,1	90,2	87,4	84,9	82,4	80,1
8	169,7	160,8	152,8	145,5	138,9	132,8	127,3	122,2	117,5	113,2	109,1	105,3	101,8	98,6	95,5	92,6	89,9	87,3	84,9
9	179,2	169,7	161,2	153,6	146,6	140,2	134,4	129,0	124,0	119,4	115,2	111,2	107,5	104,0	100,8	97,7	94,8	92,1	89,6
2.0	188,6	178,7	169,7	161,6	154,3	147,6	141,4	135,8	130,6	125,7	121,2	117,1	113,2	109,5	106,1	102,9	99,8	97,0	94,3
1	198,0	187,6	178,2	169,1	162,0	155,0	148,5	142,6	137,1	132,0	127,3	122,9	118,8	115,0	111,4	108,0	104,8	101,8	99,0
2	207,5	196,5	186,7	177,8	169,7	162,3	155,6	149,4	143,6	138,3	133,4	128,8	124,5	120,5	116,7	113,2	109,8	106,7	103,7
3	216,9	205,5	195,2	185,9	177,4	169,7	162,7	156,1	150,1	144,6	139,4	134,6	130,1	125,9	122,0	118,3	114,8	111,5	108,4
4	226,3	214,4	203,7	194,0	185,2	177,1	169,7	162,9	156,7	150,9	145,5	140,5	135,8	131,4	127,3	123,4	119,8	116,4	113,2
5	235,8	223,3	212,2	202,1	192,9	184,5	176,8	169,7	163,2	157,2	151,5	146,3	141,4	136,9	132,6	128,6	124,8	121,2	117,9
6	245,2	232,3	220,6	210,1	200,6	191,9	183,9	176,5	169,7	163,4	157,6	152,2	147,1	142,4	137,9	133,7	129,8	126,1	122,6
7	254,6	241,2	229,1	218,2	208,3	199,2	190,9	183,3	176,3	169,7	163,7	158,0	152,8	147,8	143,2	138,9	134,8	130,9	127,3
8	264,0	250,1	237,6	226,3	216,0	206,6	198,0	190,1	182,8	176,0	169,7	163,9	158,4	153,3	148,5	144,0	139,8	135,8	132,0
9	273,5	259,1	246,1	234,4	223,7	214,0	205,1	196,9	189,3	182,3	175,8	169,7	164,1	158,8	153,8	149,2	144,8	140,6	136,7
3.0	282,9	268,0	254,6	242,5	231,4	221,4	212,2	203,7	195,8	188,6	181,9	175,6	169,7	164,3	159,1	154,3	149,8	145,5	141,4
1	292,3	276,9	263,1	250,6	239,2	228,8	219,2	210,5	202,4	194,9	187,9	181,4	175,4	169,7	164,4	159,4	154,8	150,3	146,2
2	301,8	285,9	271,6	258,6	246,9	236,1	226,3	217,3	208,9	201,2	194,0	187,3	181,0	175,2	169,7	164,6	159,7	155,2	150,9
3	311,2	294,8	280,1	266,7	254,6	243,5	233,4	224,0	215,4	207,4	200,0	193,1	186,7	180,7	175,0	169,7	164,7	160,0	155,6
4	320,6	303,7	288,5	274,8	262,3	250,9	240,4	230,8	222,0	213,7	206,1	199,0	192,4	186,2	180,3	174,9	169,7	164,9	160,3
5	330,0	312,7	297,0	282,9	270,0	258,3	247,5	237,6	228,5	220,0	212,2	204,8	198,0	191,6	185,6	180,0	174,7	169,7	165,0
6	339,5	321,6	305,5	291,0	277,7	265,7	254,6	244,4	235,0	226,3	218,2	210,7	203,7	197,1	190,9	185,2	179,7	174,6	169,7
7	348,9	330,5	314,0	299,0	285,5	273,0	261,7	251,2	241,5	232,6	224,3	216,5	209,3	202,6	196,2	190,3	184,7	179,4	174,0
8	358,3	339,5	322,5	307,1	293,2	280,4	268,7	258,0	248,1	238,9	230,3	222,4	215,0	208,1	201,6	195,4	189,7	184,3	179,2
9	367,8	348,4	331,0	315,2	300,9	287,8	275,8	269,8	254,6	245,2	236,4	228,3	220,6	213,5	206,9	200,6	194,7	189,1	183,9
4.0	377,2	357,3	339,5	323,3	308,6	295,2	282,9	271,6	261,1	251,4	242,5	234,1	226,3	219,0	212,2	205,7	199,7	194,0	188,6
1	386,6	366,3	347,9	331,4	316,3	302,6	290,0	278,4	267,6	257,7	248,5	240,0	232,0	224,5	217,5	210,9	204,7	198,8	193,3
2	396,0	375,2	356,4	339,5	324,0	309,9	297,0	285,1	274,2	264,0	254,6	245,8	237,6	230,0	222,8	216,0	209,7	203,7	198,0
3	405,5	384,1	364,9	347,5	331,7	317,3	304,1	291,9	280,7	270,3	260,7	251,7	243,3	235,4	228,1	221,2	214,7	208,5	202,7
4	414,9	393,1	373,4	355,6	339,5	324,7	311,2	298,7	287,2	276,6	266,7	257,5	248,9	240,9	233,4	226,3	219,6	213,4	207,4
5	424,3	402,0	381,9	363,7	347,2	332,1	318,2	305,5	293,8	282,9	272,8	263,4	254,6	246,4	238,7	231,4	224,6	218,2	212,2
6	433,8	410,9	390,4	371,8	354,9	339,5	325,3	312,3	300,3	289,2	278,8	269,2	260,2	251,9	244,0	236,6	229,6	223,1	216,9
7	443,7	419,9	398,9	379,9	362,6	346,8	332,4	319,1	306,8	295,5	284,9	275,1	265,9	257,3	249,3	241,7	234,6	227,9	221,6
8	452,6	428,8	407,3	387,9	370,3	354,2	339,5	325,9	313,3	301,7	291,0	280,9	271,6	262,8	254,6	246,9	239,6	232,8	226,3
9	462,1	437,7	415,8	396,0	378,0	361,6	346,5	332,7	319,9	308,0	297,0	286,8	277,2	268,3	259,9	252,0	244,6	237,6	231,0
5.0	472,0	446,7	424,3	404,1	385,7	369,0	353,6	339,5	326,4	314,3	303,1	292,6	282,9	273,8	265,2	257,2	249,6	242,5	235,7

Table III

We will now describe Table V more fully. The sections given here are all for two 6″x6″ angles with 13″ cover plates or no plates at all. The upper line gives the thickness of the angles, varying by $\frac{1}{16}''$ from $\frac{3}{8}''$ to $\frac{7}{8}''$. Larger than $\frac{3}{4}''$ are usually avoided. The second horizontal line gives the gross areas of these angles. The third horizontal line gives the net areas of these angles with one hole deducted for each angle. In this case $\frac{3}{4}''$ rivets are used. The hole is actually $\frac{1}{16}''$ larger than the rivet before driving and $\frac{1}{16}''$ more is allowed for injury of metal, giving $\frac{7}{8}''$ to be deducted in all. In $\frac{1}{2}''$ angles the area deducted in each angle would therefore be $\frac{7}{16}''$ or $\frac{7}{8}''$ for two angles which, as the decimal .88, gives the difference between 11.50 the gross area of the angles and 10.62 the net area with one hole deducted in each angle. The fourth horizontal line similarly gives the net areas with two holes deducted. The next line gives the allowable

flange stresses with no cover plates, which are obtained by multiplying the net areas with one hole deducted by 16,000, the allowable stress per square inch. The columns below give the allowable stresses in a similar manner for these same angles with cover plates, which are obtained by adding the net areas of the angles with two holes out to the net areas of the cover plates and multiplying by 16,000. These of course are the allowable flange stresses for the tension flanges. This, as we have noted, is the usual limiting feature in the design of a flange.

The rivet pitch should always be determined and not left until later as it is frequently found that this rivet pitch is so small that the material would be injured by the holes being too near together. This can be determined from Table III. This gives the various allowable shears for pitches varying by $\frac{1}{16}''$ from $1\frac{1}{8}''$ to $2\frac{1}{4}''$ for various effective depths, varying by 1/10 foot from 1.3 to 5 feet, for $\frac{3}{4}''$ rivets in double shear. The rivets are in double shear if the thickness of the web is $\frac{5}{8}''$ or more. Along the top of the table will be found various values for $\frac{3}{4}''$ rivets in bearing on webs of different thickness and also for double shear. If the thickness of the web is less than $\frac{5}{8}''$ the value of the allowable shear in the table should be reduced by dividing by the value of a rivet in double shear (8,840) and multiplying by the value of the rivet in bearing on the web used. With an effective depth of 2.4 we find that a rivet pitch of $1\frac{3}{16}''$ is good for 214,400 shear, which is a little greater than the 206,500 shear on the girder. If necessary this required shear may be reduced by taking into account that part of the moment which is taken by the web. This is usually not done, however. If the uniform load were applied to the flange this also would have to be taken into account as the shear on the rivet would then be the resultant of the vertical shear from the uniform load and the horizontal shear due to the flange stress in the girder.

Table III is derived from the formula:

$$p=\frac{Vd}{S}$$

where V is the value of one rivet in double shear or bearing as the case may be, d is the effective depth in inches, and S the shear at the point on the girder where the rivet pitch, p, is required. When the uniform load is applied directly to one of the flanges this formula should be modified by substituting for S the quantity $\sqrt{S^2+a^2d^2}$, where a is the uniform load per lineal inch of girder.

When it becomes necessary to figure the rivet pitch closer than is given by these formulæ by taking into account the portion of the bending taken by the web, we may increase the rivet pitch obtained by the formula just given by using the formula:

$$\frac{A+a}{A}p=p'$$

where A is the area of the flange angles and plates, a the area of one-eighth of the web, and p' the revised rivet pitch.

This is as far as it is necessary for the designer to go as the detailer in the shop can take care of the rest of the design if the loading is given him. It is possible, however, for the estimator to figure

BACK OF Ls TO C G FLANGE (INCHES)																		
t OF PLS		0	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 1/4"	1 3/8"	1 1/2"	1 5/8"	1 3/4"	1 7/8"	2"	2 1/8"	2 1/4"
6" × 6" Ls, 13" PLS	3/8	1.64	98	84	71	57	.47	.36	27	17	08	-01	-08	-13	-25	-33	-41	-.49
	7/16	1.66	1.05	91	79	65	55	44	35	25	16	07	00	-05	-17	-25	-33	-41
	1/2	1.68	1.12	98	.86	73	63	52	43	33	.24	15	07	-02	-10	-18	-26	-34
	9/16	1.71	1.18	1.05	93	80	70	60	50	40	.31	23	14	06	-03	-11	-19	-.27
	5/8	1.73	1.24	1.11	99	87	.77	67	57	47	.38	30	21	13	04	-04	-12	-.20
	11/16	1.75	1.29	1.16	1.04	93	83	73	63	54	45	36	28	19	10	03	-05	-13
	3/4	1.78	1.34	1.21	1.10	99	89	79	69	60	51	42	34	25	16	09	01	-07
	13/16	1.80	1.38	1.26	1.15	1.04	.94	.84	75	66	.57	48	40	.31	33	15	.07	-.01
	7/8	1.82	1.42	1.30	1.19	1.09	99	.89	80	71	.62	54	45	.37	.29	.21	13	.05

Table IV

ALLOWABLE FLANGE · STRESSES									
2-6"×6" Ls	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"
Gross A	8.72	10.12	11 50	12.86	14.22	15 56	16.88	18 18	19 46
Net A	8.06	9.36	10.62	11 88	13 12	14 36	15.56	16.76	17.92
do 2h	7.40	8 58	9.74	10.90	12.04	13 16	14.26	15 34	16 40
Flg St No Pls	129,0	149,8	170,0	190,0	210,0	229,8	249,0	268,2	286,8
13"×5/16"	174,6	193,4	212,0	230,6	248,8	266,8	284,4	301,6	318,6
3/8	185,9	204,7	223,3	241,9	260,1	278,1	295,7	312,9	329,9
7/16	197,1	215,9	234,5	253,1	271,3	289,3	306,9	324,1	341,1
1/2	208,4	227,2	245,8	264,4	282,6	300,6	318,2	335,4	352,4
9/16	219,6	238,4	257,0	275,6	293,8	311,8	329,4	346,6	363,6
5/8	230,9	249,7	268,3	286,9	305,1	323,1	340,7	357,9	374,9
11/16	242,1	260,9	279,5	298,1	316,3	334,3	351,9	369,1	386,1
3/4	253,4	272,2	290,8	309,4	327,6	345,6	363,2	380,4	397,4
13/16	264,6	283,4	302,0	320,6	338,8	356,8	374,4	391,6	408,6
7/8	275,9	294,7	313,3	331,9	350,1	368,1	385,7	402,9	419,9
15/16	287,1	305,9	324,5	343,1	361,3	379,3	396,9	414,1	431,1
1	298,4	317,2	335,8	354,4	372,6	390,6	408,2	425,4	442,4
1 1/16	309,6	328,4	347,0	365,6	383,8	401,8	419,4	436,6	453,6
1 1/8	320,9	339,7	358,3	376,9	395,1	413,1	430,7	447,9	464,9
1 3/16	332,1	350,9	369,5	388,1	406,3	424,3	441,9	459,1	476,1
1 1/4	343,4	362,2	380,8	399,4	417,6	435,6	453,2	470,4	487,4
1 5/16	354,6	373,4	392,0	410,6	428,8	446,8	464,4	481,6	498,6
1 3/8	365,9	384,7	403,3	421,9	440,1	458,1	475,7	492,9	509,9
1 7/16	377,1	395,9	414,5	433,1	451,3	469,3	486,9	504,1	521,1
1 1/2	388,4	407,2	425,8	444,4	462,6	480,6	498,2	515,4	532,4
1 9/16	399,6	418,4	437,0	455,6	473,8	491,8	509,4	526,6	543,6
1 5/8	410,9	429,7	448,3	466,9	485,1	503,1	520,7	537,9	554,9
1 11/16	422,1	440,9	459,5	478,1	496,3	514,3	531,9	549,1	566,1
1 3/4	433,4	452,2	470,8	489,4	507,6	525,6	543,2	560,4	577,4
1 13/16	444,6	463,4	482,0	500,6	518,8	536,8	554,4	571,6	588,6
1 7/8	455,9	474,7	493,3	511,9	530,1	548,1	565,7	582,9	599,9
1 15/16	467,1	485,9	504,5	523,1	541,3	559,3	576,9	594,1	611,1
2	478,4	497,2	515,8	534,4	552,6	570,6	588,2	605,4	622,4
2 1/16	489,6	508,4	527,0	545,6	563,8	581,8	599,4	616,6	633,6
2 1/8	500,9	519,7	538,3	556,9	575,1	593,1	610,7	627,9	644,9
2 3/16	512,1	530,9	549,5	568,1	586,3	604,3	621,9	639,1	656,1
2 1/4	523,4	542,2	560,8	579,4	597,6	615,6	633,2	650,4	667,4

Table V

closer if more information is given, especially the lengths of the cover plates.

We found that $1\frac{1}{16}''$ of cover plates was required. It is customary to use at least $\frac{3}{8}''$ plates and not over $\frac{3}{4}''$. In this case a $\frac{1}{2}''$ and a $\frac{9}{16}''$ plate could be used, placing the $\frac{1}{2}''$ plate next to the angles. To find the point where we can cut off these plates we must find what the strength of the girder would be with the $\frac{9}{16}''$ plate omitted, and also with both plates omitted. If both plates were omitted we would have left at that point the two angles with two holes out of each and the web plate to resist bending. This moment of resistance would therefore equal 14.26x16,000x2.42 + 92,600, or 644,600.

The moment of resistance of the girder with only the angles and $\frac{1}{2}''$ plate can be found by looking up the allowable stress in the flange in Table V and multiplying it by the effective depth: thus, 318,200x2.42+92,600=863,600.

We must now find the moment on the girder at various points and interpolate between them to find the point where we can drop off the cover plates.

The moments on the girder at 5, 6, 7 and 8 feet from the right hand reaction are found thus:

$$
\begin{aligned}
5R_r - 117\text{x}16\tfrac{1}{2}\text{x}5\text{x}2\tfrac{1}{2} &= 631{,}800\\
6R_r - 117\text{x}16\tfrac{1}{2}\text{x}6\text{x}3 &= 751{,}300\\
7R_r - 117\text{x}16\tfrac{1}{2}\text{x}7\text{x}3\tfrac{1}{2} &= 972{,}800\\
8R_r - 117\text{x}16\tfrac{1}{2}\text{x}8\text{x}4 &= 988{,}100
\end{aligned}
$$

By interpolation we find that both plates can be omitted 5′ 1″ from the right hand reaction, and the $\frac{9}{16}''$ plate can be omitted 6′ 6″ from the right hand reaction. It is good practice to run the plates slightly beyond these points so as to get in enough rivets before the point is reached to enable the plates to do their work. It is common practice therefore to extend the plates about 1′ 3″ beyond the theoretical points of cut-off.

In a similar way we may find the moment on the girder at points 3, 4 and 5 feet from the left hand end, thus:

$$
\begin{aligned}
3R_l - 117\text{x}16\tfrac{1}{2}\text{x}3\text{x}1\tfrac{1}{2} &= 611{,}300\\
4R_l - 117\text{x}16\tfrac{1}{2}\text{x}4\text{x}2 &= 811{,}600\\
5R_l - 117\text{x}16\tfrac{1}{2}\text{x}5\text{x}2\tfrac{1}{2} &= 1{,}008{,}300
\end{aligned}
$$

By interpolation we find the cut-off of the plates to be 3′ 2″ and 4′ 3″ from the left hand end. Therefore the $\frac{9}{16}''$ plates will be 6′ 3″ long and the $\frac{1}{2}''$ plates 8′ 9″ long.

The rivets in the stiffeners over the end columns and under the middle column will be in double shear and be worth 8,840# each. By dividing the reactions and column load each by this value we obtain the number of rivets required in the stiffeners in each case, thus:

$$
\begin{aligned}
309{,}700 \div 8{,}840 &= 35\\
131{,}200 \div 8{,}840 &= 15\\
206{,}500 \div 8{,}840 &= 24
\end{aligned}
$$

The stiffener angles themselves are designed as small columns having an unsupported length equal to half the depth of the girder, which in this case would be only 15″. From a table of two angle struts we may pick out the required sizes for these angles.

The web of the girder we designed as 30″ deep while the angles for the flanges had 6″ legs which would leave $18\frac{1}{2}''$ in the clear between the angles. If the rivets were spaced $2\frac{1}{2}''$ apart we could only get 7 rivets in a line between the flange angles, which with two in each angle would give 11 in each stiffener. Therefore under the middle column we would have to have at least three lines of rivets. To make these symmetrical we would use four lines or eight angles in all for stiffeners. This could be done by using eight 5 x $3\frac{1}{2}$ x $\frac{3}{8}''$ angles.

If the girder was placed on the tops of the columns which carried it and they carried no other load we can design the end stiffeners from the data already used. We will use two angles at the extreme end and four over the inside of the column similar to those shown in the June number of the THE FORUM. The two end angles we will design to carry one-half of the load while the two inside angles will be designed to carry two-thirds of the load. One-half of the left hand reaction is 103,250, which will require two 5x$3\frac{1}{2}$x$\frac{9}{16}$ Ls, while two-thirds of the reaction would be 138,000 which would require four 5x$3\frac{1}{2}$x$\frac{3}{8}$ Ls. At the other end one-half of the reaction would be 65,600 which would require two 5x$3\frac{1}{2}$x$\frac{3}{8}$ Ls, and two-thirds of the reaction would be 87,300 which would require four 4x3x$\frac{5}{16}$ Ls, or we could use only two 5x$3\frac{1}{2}$x$\frac{7}{16}$ Ls. It is often preferred in shops to use fewer sizes than this and to throw away a small amount of material for the sake of the uniformity and simplicity of the shopwork, and this is regarded as good practice.

As we noted in the June number, there are a great many rules as to the use and spacing of intermediate stiffener angles. One rule is that when the depth of the web between flange angles (in this case $18\frac{1}{2}''$) is more than 60 times the thickness of the web (in this case only 27) then stiffener angles must be used and they cannot be spaced over 6 feet apart even if the formula gives a greater distance. The formula for this distance is:

$$d - \frac{t}{40}(12{,}000 - s)$$

where d is the spacing required in inches, t the thickness of the web in inches, and s the shear on the web in pounds per square inch. This formula is conservative and safe to use. If for any reason it is inadvisable to use as small a spacing of the stiffener angles and this distance is not over the maximum 6 feet allowed, we can increase the distance between them by increasing the thickness of the web, which would of course decrease the shear per square inch.

Modern Floor Coverings

PART III

By E. H. HOWARD

IN the discussion of composition floors the type made of magnesium salts was mentioned; it would not be sufficient, however, to refer to this type of flooring merely "en passant." It has in many instances furnished a floor covering which has won it a place in the catalog of materials worthy of full consideration where a durable, sanitary, inert surface is required. The color possibilities and pattern arrangements offer a wide field for study. Laying it in squares with surrounding lines of another color, is one effective method of using this composition. The colors are permanent, if properly used, and can be varied in the mixing to match almost any shade. In the standard colors the red is the most likely to give trouble, and that only by slowly fading.

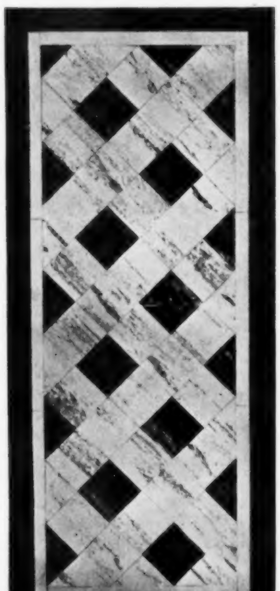
There is now in the process of development still another variant of the magnesium floor covering. It is not yet on the market, commercially, but it has been tested by many months of actual hard wear. This material is a combination of magnesium salts, from which the chlorides are entirely absent, and ground cork. Possessing as it does the inertness and durability of magnesium compositions, with the resilience and sound-proof qualities of cork, it merits attention.

The cork is ground, not pulverized, and mixed with the magnesium salt in a plastic mass. To this is added the color pigment, which, by the way, does not color the cork, and when the whole mass is of the proper consistency it is placed in moulds under high pressure and cured. After being cured, the moulds are removed and the material is cut into tiles and ready to lay. These tiles have been used for trucking surfaces and so far have developed no defects. The surface is non-absorbent, so that grease does not penetrate, and washing with any cleanser or soap will thoroughly clean the surface.

They may be cemented directly to concrete with a waterproof cement or may be laid on a wood floor. When the under surface is wood there should be a layer of coarse cloth tacked to the wood floor, and to this the tile is attached by means of a special quick-setting cement. The cloth serves merely as a protection in case of shrinkage in the wood. This material may be used in large sheets as well as in small tile, and therefore can be used as a dado on the wall. It is also possible to use it in the form of a sanitary base.

There is still another form of floor covering which is made in colors, patterns, shapes and sizes to suit the designer's requirements. The foundation and principal component is cement. All architects are familiar with the cement tile which was on the market a few years ago. It was not a material to appeal, excepting in occasional low cost work. The tile we are now considering is, however, far different and should not be confused with the old cement tile.

Without doubt, it will be a surprise to many to know that some of the fine "old" Spanish tile floors which are seen in some of the southern estates and in Cuba are manufactured of modern cement.



Panel of Simple Pattern Showing Veining

Decorative Rubber Flooring in Piano Warerooms of C. C. Harvey Co., Boston
Kilham, Hopkins & Greeley, Architects

This new product, having the appearance of marble, can be employed in varied architectural patterns and is noiseless and resilient under foot

Cement Tile Floor in Pasaje Hotel, Havana, Cuba
Each unit is composed of four similar tile

The illustrations presented here will give an idea of the great opportunities for securing fine copies of old tile and the wide variety of color and design which are at the command of the architect or engineer, if he elects to employ this type of floor. Cement floor tile* is no new product, nor is it a material which has not proved its value in the test of time. There are in Havana today some floors which are as tight and flush as new work, but which have been laid and used for over 125 years.

Cement tile is simple in manufacture but requires skilled artisans to make the designs in the tile in proper manner. Steel moulds are used and this assures even sizes, true forms and square edges. The moulds are filled with cement and the designs are pressed in. The tile is then subjected to a pressure of 4,500 pounds to the square inch. The tiles are "seasoned" with water and are then "cured" for a definite time, depending on the size and character of mixture, in a storage room kept at a fixed temperature. The whole process results in an exceedingly dense, compact, hard substance, not subject to action of heat or cold and free from danger of swelling or shrinkage.

If the tile is to be laid on a concrete floor the concrete should be kept about two inches below the finished surface. The structural floor should be smooth, but not steel troweled. Upon this under surface is laid the tile bed of approximately $1\frac{1}{8}$ inches of cement mortar, and then the finished product is placed in position. From this point the process of laying the floor is the same as for ordinary tile. After the floor has been thoroughly washed a light coat of floor wax is applied and wiped off with a cloth. One more wax treatment six months later is recommended as all the finish the floor will need to give a fine, hard sheen.

Floor coverings play so vital a part in modern construction that an exhaustive study of the characteristics of the various materials is of great importance. Linoleum, cork carpet, cork tile, rubber tile, synthetic rubber and composition floors have been discussed and presented in a manner, but not so thoroughly as the subjects deserve. The analysis, however, will tend to give the architect a starting point for his own personal investigations. Facts have been presented which may at times be at variance with the salesman's talk, but facts are unalterable.

In reality there is little need of expressing the truism that a floor may make or mar an otherwise beautiful room. It is obvious. The profession has been interested in trying to secure something for floors which would be "wear-proof," noiseless, artistic, sanitary, easily cleaned and of low maintenance cost. We cannot prophesy what shall be in future, but one can easily look back and note the progress that has been made in the last decade and hope, perhaps not in vain, that the future will bring us a material which will be even superior to those we now possess.

There is a vast field opened up in the supplying of materials suitable for flooring of buildings of different kinds, for substances of various sorts are required for buildings serving different uses. The ingenuity of modern manufacturers may be relied upon to meet the demand and the market offers a range of materials broad enough to fulfill the need of flooring suited for different purposes. The adaptability of the floor coverings which have been described in these pages is the reason for much of their popularity, for they are to be had in units of such flexibility that they may be laid without difficulty.

Cement Tile Floor in National Bank of Cuba

*We are indebted to Mr. A. L. Hutchinson, architect, of Mobile, Ala., for some of the data on the cement tile and for the illustrations included here.

BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

Straight Talks with Architects

I. HOW CAN I GET MORE BUSINESS IN MY OFFICE *NOW?*

THE other day a good friend of ours came into the New York office of THE FORUM. He is not an architect; as a matter of fact he is the owner of a department store in one of the smaller cities near New York. He brought with him, however, certain suggestions regarding business getting which should be of practical value to every architect.

It happens that his interest in architecture is confined to the building of a residence, for the planning of which he retained an architect about two years ago. His experience in this problem of building a home was similar to that of many architects' clients who hoped to build in 1920. After the plans were completed and bids taken he found that the house would cost him eight or ten thousand dollars more than he was willing to spend. After making certain of the cost, he refused to build. Naturally this was a disappointment to the architect, and the plans for this house were filed away, with many others, in the hope that a happy day would come when costs would be low enough to meet the clients' approval.

About a month ago an enterprising sub-contractor (who had figured this contract a year before) visited the architect's office and asked if there was any chance to re-figure it. The architect told him that there was no chance. Spurred on by a need of work, however, this sub-contractor went to the owner and told him that he would like to re-figure his part of the work, as he felt that a substantial saving might be made over last year's bid. When the owner asked him why he thought this might be the case now, the sub-contractor replied that there were several reasons, among them being:

1. Somewhat lower prevailing prices for materials.
2. Possibility of securing the right kind of mechanics.
3. The increase of efficiency of workmen in the building trades.
4. The market for both labor and materials being steadier, and it not being necessary to add any large contingency fee.

The prospective owner of the house, being a shrewd buyer, realized the soundness of these reasons and told the sub-contractor that he would be glad to have a new figure, although he felt that it would probably be a waste of time. Much to his surprise, however, the figure which came in showed a really substantial reduction in costs. Convinced that this condition might bear investigating the owner went to his architect and instructed him to get both general contract and sub-contract figures from the same firms or individuals who had figured before. The net result (to the surprise of both owner and architect) was that where the cost of this house last year totaled approximately $30,000, the same house this year would cost less than $22,000. On this basis the owner was willing to proceed and the house is now under construction.

It may be noted here that the architect's eyes were opened and that he proceeded at once to give these figures to two or three of his clients who for some time had been talking about building new residences. The net result has been that two other contracts have been awarded from the office of that architect. Certainly no credit is due to this particular architect for possessing an instinct for the development of business. It took an insistent sub-contractor and a keen merchant to anticipate and recognize conditions of which the architect himself should have been cognizant.

This will explain the attitude of the merchant in question who, when we had told him that business was slow in most architects' offices just now, replied in no uncertain terms that if, from a sales viewpoint, he ran his department store in the way that most architects conduct their businesses he could not pay interest on the mortgage. We could not help but recognize the truth of his statement and into our minds there came the memory of a question asked by a capable architect just a few days before—the question which constitutes the heading of this article. It was asked in a tone of pathetic hopelessness, as much as to say, "of course you cannot tell me."

It is true that we cannot tell any architect exactly where to go in order to get a new commission today. We know, however, that certain architects' offices *are* busy and we know *why* they are busy. In most cases it has not been luck or a fortunate social connection, but it has been the attitude so well expressed in the slogan, "1921 Will Reward Fighters." These architects who are fortunate enough to be busy have kept closely in touch with market conditions; they have noted the increasing efficiency of labor in the building construction field and they have analyzed the business needs of their clients and have spread wide a drag-net for

sub-contractors' figures, which have in many cases been much lower than those quoted in the average market figures—lower, in fact, than the architects themselves had anticipated.

Now, in the episode of the merchant and his house, the ideal condition would have been that the architect himself might have ferreted out the fact that this house could be built for a substantially lower price. According to this ideal he would have brought this fact to the attention of his client, whereupon he would have received an order to proceed with the work.

Why did he not think of doing this?

Why is it that, with so many possible building projects in view, the average architect is content to spend his time damning conditions in the building industry, when perhaps in his office there are tentative plans or projects which would proceed immediately if the architect used the right tactics with the owners?

When the average architect reads these statements he may probably sit back and say, "Oh well, it is easy enough for a writer to tell about these things, but it is not practicable to do them." We believe that the principal reason that architects as a rule are not good business getters, and consequently are usually numbered among those "who wait to be called," is because the average architect does not appreciate the fundamental business conditions which affect the building industry. Consequently, when a client tells him that he is waiting for prices to go back to pre-war levels the architect can only sigh and hope for the happy day when building costs will reach the levels of the depressed period of 1913.

On the other hand, we believe that practically every architect is receptive to ideas, particularly at this time when every office needs more business. Therefore a review of the general conditions, showing the trend of building construction costs and the important facts affecting the stabilization of material and labor prices, should prove valuable data in discussing building conditions with clients.

The only way that the so-called buyers' strike in the building field can be broken is for every architect to enlist himself actively in disseminating the market information which the prospective building owner should have. The Architectural Forum feels this condition so strongly that at the present writing a questionnaire is being sent to every architect in the United States asking him for a list of the number of possible projects which are dormant in his office because of this same buyers' strike. The information thus obtained is to be used in the proper channels to help correct false impressions as to building activities when market conditions become more stabilized.

Only the architect, however, has opportunity for the necessary contact with his clients who, in sum total, make up his division of the building field, and it is certainly the architect's duty to acquaint himself in every possible manner with conditions of building costs in order that he may discuss this question definitely and intelligently with his clients when they are seriously considering the advisability of building.

A review of the facts as to present and future conditions in the building industry may in a sense be termed "dry reading," but at the same time this is the sort of information which any architect can use and which, if it does not result in the development of immediate work, will certainly impress the prospective client with the fact that the architect is giving careful consideration to his problems and business interests.

From several sources it is learned that the average cost of building construction is today about 100% higher than in 1913, which is usually referred to as the pre-war period. The index figure of wholesale prices of building materials, as prepared by the United States Department of Labor, indicated for July, 1921, a figure of 200 as compared to a figure of 100 in 1913 and 333 in July of 1920. In other words, the average cost of building materials has come down more than half way from the peak to the pre-war level. It may be noted also that the *Engineering News-Record* has recently developed an interesting method of figuring an index figure of construction cost. Briefly, this is done by taking the total annual production of steel, lumber and cement, together with the total number and wage of common laborers in the United States, exclusive of farm laborers. To convert these factors into terms of money, 1913 was selected as the base whereby index figures were prepared for every year following, using the material prices quoted at the given time together with the average number and wage of common laborers in 20 representative cities. A careful study was made of the relative quantities of these materials and amount of labor used in construction work, and this basic index figure was then developed:

2,500 lbs. structural steel, $1.50 per 100 lbs.	$37.50
6 bbls. cement, $1.19	7.14
600 ft. b. m. pine, $28.50	17.10
200 man-hours, $.19	38.00
	$99.74

The index figures of construction development in this manner since 1913 are:

1913	$99.74
1914	92.99
1915	98.26
1916	137.29
1917	189.02
1918	202.77
1919	207.81
1920	238.79
1921 (7 months)	214.39
July, 1921	194.82

This index figure of July, 1921 also shows approximately 100% higher cost of construction than in 1913.

We may introduce at this point, however, the question as to whether it is fair to take the construction cost of 1913 as a pre-war level and expect building costs to come back close to this figure before there will be any general resumption of

building activity. R. C. Marshall, Jr., General Manager of the Associated General Contractors, has given careful study to this matter. It is his opinion that the building costs of 1913 and 1914 do not constitute a normal price level. He declares that for 20 years prior to the world war all wholesale prices were steadily increasing at the rate of about 2½% a year and that this increase, except for the war, in all probability would have passed the so-called normal of 1921 at the level which is now designated as 120 in the scale of indices.

At the present time (August, 1921) the index figure prepared by the United States government stands at 148 for general wholesale prices and at 200 for wholesale building material prices as compared to the standard of 100 set in 1913. It must be realized that the year 1913 was a year of considerable depression and that wholesale building material prices at that time were sub-normal. Considering the fact that all wholesale prices have been advancing approximately 2½% a year, it is but natural to believe that, even if there had been no war, wholesale building material prices would have advanced at least that much which would bring the index figure to 120. Added to this is the fact that the index figure of building material costs of 1913 was sub-normal. It is therefore fair to believe that if the war had not intervened the general increase in labor costs and other factors contributing to increased prices would have brought the normal index figure of building materials at least to 130, if not somewhat higher. We find, therefore, that building costs today are approximately 70 points higher than the established normal for 1921.

There is another factor to be considered—the line of stabilization of prices. At first thought it might seem that prices should stabilize at the so-called normal level. Considering this matter we may turn from this question for a moment to analyze the accompanying illustration (Fig. 1) which is merely a chart showing the wholesale price fluctuation in the United States for 110 years. It will be noted that after the war of 1812 and after the civil war it took periods of about 20 years for prices to reach the pre-war levels. Naturally, building construction cannot be expected to decrease in cost any more than in proportion to the general decrease in all commodities and labor costs. We may therefore expect not only that the ultimate reduction in cost cannot be greater than an index figure which normally would be 30% higher than in 1913, but that we must allow a period of a few years for all costs to reach a normal level. Granting that through the Federal Reserve Bank (and other recently established means of controlling economic adjustments during a re-construction period) this period will be considerably shortened as compared to similar periods following previous wars, it is plain that we cannot expect a return to a so-called pre-war level or to a normal index figure in less than eight or ten years. The consensus of opinion seems to be that building should proceed when costs have become stabilized. Evidently the line of stabilization will not be a straight line drawn through normal points for the next ten years, but will bear a direct relation to the falling of all wholesale prices and labor costs.

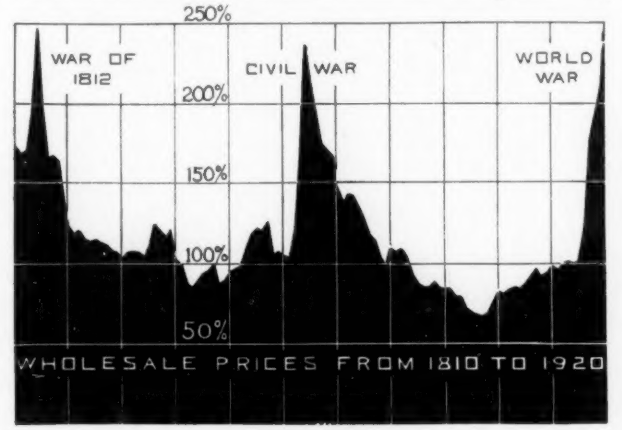


Fig. 1. This diagram, prepared by The Russell Sage Foundation, illustrates the fluctuating of prices during 110 years. The contour of the curve of prices is a condensed version of the economic history of the country.

Leonard P. Ayres, Vice-president of the Cleveland Trust Company, has this to say in a recently issued bulletin entitled "Price Changes and Business Prospects": "We may lay down six general rules with regard to price movements":

1. Wholesale prices move first and farthest.
2. Retail prices move more slowly and less violently.
3. Wage levels change more slowly than levels of prices.
4. Manufactured articles, having a high labor content, change their price levels more slowly than do raw materials, having a low labor content.
5. Salaries change more slowly than wages.
6. Rents change more slowly than prices, wages or salaries.

Evidently, the cost of building has still to feel the reaction of the reduction of wholesale prices which is being followed by a reduction in retail prices of building materials. An important decision on wages of building labor just rendered by Judge Landis (described in detail in the Service Section of this issue) bids fair to establish a precedent in the reduction of building labor costs. In view of these facts we may expect the point of stabilization for the year 1922 to be fairly between the normal index figure of 130 and the present index figure of 194.82. In other words, it is approximately 170 now and will descend during the next few years in relation to all gradually falling prices. It may be expected that the line of stabilization in building costs will gradually fall to meet what might be conceded as the normal, in 1930.

We can see ahead, therefore, a period of building activity started by those who really need buildings and who realize that there is nothing to be gained by waiting over a long period of years for such reduction in costs as may be anticipated along the line of stabilization just described. The second diagram shown here (Fig. 2) indicates how the cost of building increased disproportionately to

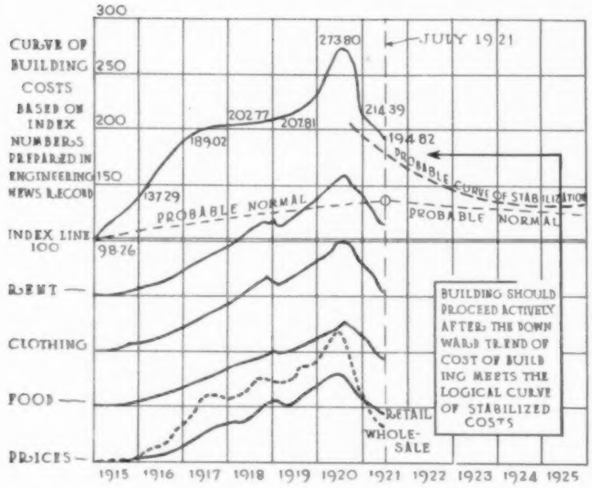


Fig. 2. This chart shows a comparison of the changes in the cost of building, rents, clothing, etc., since 1915. A line showing the probable normal cost of building if there had been no war; also a probable curve of stabilization, based on information by Leonard P. Ayres, Vice-president, Cleveland Trust Company.

the various elements which enter into the cost of living. This, of course, was due to the unusual demands of the war period and it will be seen that the line of building costs is now approaching the same tangent of reduction shown by the lines of the elements which enter into the cost of living. Before many months these lines will be running approximately parallel, and that is the time when building costs will be definitely stabilized. It would seem that the breaking of the buyers' strike in the building field is but a matter of a comparatively short time, when the public will realize that it is not a question of waiting for building costs to reach the so-called pre-war level, but for the cost of building to maintain a balanced relationship with rents, clothing, food, wages and salaries.

Another point which is encouraging in regard to investment building is that in entering a long period of falling prices the value of the dollar is increasing. This point is brought out strongly in deductions made by Leonard P. Ayres as a summary of the results of his investigations of price changes and business prospects, from which we quote:

1. Business prosperity depends on the prices of things, of services, and of money, and on the relation of each to the others.

2. When prices are changing, wholesale prices move first and most, retail prices next, wages next, and rent last and least.

3. Any considerable change in the general price levels of other countries is reflected by corresponding changes in the price levels of this country. We are no longer economically independent. The prosperity of each country is in part dependent on the prosperity of other countries.

4. While price inflation and reduction have been serious here, they have been far more violent abroad. We are less hard hit in this period of readjustment than is any other important nation.

5. Three times during the past 110 years the general wholesale price level has reached the 1920 figures. In each of the two previous cases the peak of high prices has been followed by about 30 years of irregularly falling prices, and then by about 20 years of rising prices.

6. It is probable that we are entering upon an extended period of falling prices, broken by occasional shorter periods of rising prices. The conduct of business in such times presents radically different problems from those to which Americans have become accustomed during the past quarter-century of rising prices and shrinking dollars.

7. During times like the present, when prices are high, but falling, plant extensions should be avoided unless greatly needed; financing should be on short maturities, if possible; debts should be paid before the dollar gets still more valuable, and hence harder to secure; the accumulation of stocks of raw materials should be avoided; bank balances should be built up; bonds should be purchased.

8. So long as the dollar continues to increase in purchasing power, debts, rents, and taxes will be harder to pay. Business transactions or investments, through which stated sums of money will be received at periodic intervals in the future, will prove more profitable than present standards would lead one to believe, while agreements to pay fixed amounts at future dates will be more difficult to live up to than present conditions and past experience would indicate.

9. In the long period of falling prices following the civil war wages declined far less than did prices. In that same period the productivity of labor greatly increased as the mechanical means of production were improved. The future course of wages depends largely on the degree to which the per capita output can be increased, through improvements in management, processes and machinery.

10. The immediate prospects of business at any given time can best be judged by studying the development of business cycles, which progress through phases of prosperity, forced production, liquidation, and readjustment, back to a revival of prosperity. They are most accurately foretold by the changes in the market prices of industrial securities. At present we are passing through the latter stages of liquidation, and have entered upon those of readjustment.

In order that a graphic presentation of some of the points brought out in this article may be available, we have prepared from various sources of data the chart shown as Fig. 2 which indicates the relative fluctuations in wholesale and retail prices, the cost of food, the cost of clothing, the cost of rent and the cost of building since 1915. We have also indicated on this chart a proper approximate normal line along which building costs would have passed if there had been no war. We have indicated also the probable curve of stabilization of building costs. This is based on its local relationship to generally falling costs, and when the curve of the cost of building comes slightly farther down to meet this curve of stabilization it may be expected that we are entering upon an era of active building construction. Probably this will not be a building boom, but will be a steady period of activity, which is much more desirable. It may be noted with additional interest that due to better control of economic conditions and to the intervention of the Federal Reserve Bank during the reconstruction period, that in about two years the cost of living will have come down as far as it dropped in five years after the civil war. This fact is significant in that it promises a much shorter period of decreasing prices and consequently a more rapid recovery from the effects of the war than was enjoyed after either the war of 1812 or the civil war. Is it not evident that the period between the fall of 1921 and the time of the return to stabilized building costs, which is indicated for some time next year, should be one of planning? If the architect can demonstrate to a prospective client that the time to plan his building is drawing near, this should mean the development of additional work in many offices. Certainly those who are forced to build will feel better if their plans are ready, in order to take advantage of the first period of stabilization in the building market.

Plate Description

THE CHARLES T. MILLER HOSPITAL, ST. PAUL

C. H. JOHNSTON, ARCHITECT

THE tendency of the modern hospital is away from the traditional, stereotyped development which made a hospital a dreary place and toward another form of treatment which is making it as attractive and inviting as its character and purpose permit. This tendency has been noticeable for some years and in widely separated sections of the country, and the Charles T. Miller Hospital, recently erected at St. Paul, exemplifies this difference in treatment and presents some interesting solutions of unusual problems.

The considerable area which the hospital occupies fronts upon three streets of radically different grades—Summit avenue, one of the chief thoroughfares of the city, College avenue and Rice street. The placing of the main entrance upon College avenue is due partly to the more favorable topographical conditions and partly to avoid the congestion of traffic which blocks Summit avenue. Such placing of the building brings the greater part of the hospital into a position where it receives the greatest possible amount of sunshine, and the arrangement of administrative and service departments near the main entrance renders the first floor available for wards and patients' rooms overlooking a lawn upon the Summit avenue side. This placing of the present structure upon the property leaves space for future buildings.

Free beds, of which there are 50, are arranged in small wards containing one, two, four or six beds. The remaining 166 beds which the hospital contains, are entirely in private rooms, most of which are equipped with private baths, the rest having individual lavatories and toilets. The planning of the building places the service departments of each floor, such as diet kitchens and service rooms, near the central part of the structure to make as easy as possible the distribution of food and to afford every convenience for examinations and the handling of surgical dressings, this section of the building being served by electric elevators, which connect the diet kitchen with the auxiliary kitchens upon each floor. The passenger elevators extend to the roof of the main building, where convalescent porches and other features for outdoor treatment will be provided. Upon the fourth floor the north wing contains the operating rooms, obstetric section and laboratories. The rooms for operating and their accessory rooms, complete with all surgical equipment, are at the north end of the wing, and delivery, wash-up and sterilizing rooms, with the nursery, are at the opposite end. This separation of the nursery from close proximity to rooms for maternity patients in the south wing has proved to be advantageous.

Connected with the main building by pipe and service tunnels is the two-story structure which contains the power plant with its equipment upon the lower floor and the laundry upon the floor above. Heating is supplied by a two-pipe vacuum system making use of exhaust steam from engine units. In the boiler room are placed two 250-h.p. water tube boilers, and the pump room contains vacuum, boiler feed water and service pumps, feed water and domestic water service heaters. The main facade of the hospital presents a well designed treatment in the renaissance style, of dark red brick trimmed with Indiana limestone.

View of the Miller Hospital Showing Service Building and Ambulance Court

EDITORIAL COMMENT

THE ARCHITECTURAL PROFESSION AND FIRE PREVENTION

THOUGHTFUL writers and economists have repeatedly pointed out the colossal annual loss in property and lives which is incurred in America through fire, and the pressing need for so ordering our methods of building that this drain upon the country's resources may be lessened. It has been frequently set forth that during the past few years when building has been greatly curtailed, owing to conditions during and following the war, the losses through fire have continued unchecked with the result that new construction has scarcely equaled that destroyed. Considerably more than $300,000,000 goes up in smoke every year and some 18,000 human lives are lost as a contributing result. In addition to this vast loss in property and lives there must be considered the enormous cost borne each year,—not for fire prevention but merely for fire protection,—only as a safeguard against the actual spreading of fires already started. This vast expense, which might at least be greatly reduced, is adding yearly to the crushing weight of taxation already being carried upon the patient shoulders of the American public.

Reflection on our fire losses is once again brought to mind by the approach of "Fire Prevention Week" beginning October 9, a date selected because of its being the anniversary of the memorable Chicago fire. Public attention thus focused on the problem has a special meaning for architects. In this era of progress in so many directions and at a time when it is claimed that certain evils hitherto regarded as necessary have been overcome, it is hardly to the credit of the architectural profession or the building trades that the country continues to build by methods and with materials which have already involved a ruinous loss of property and a far greater loss in human lives than all the wars in which the United States has ever been engaged. That the greater portion of this is needless is attested by the fire records of Europe, where the per capita fire loss is only one-tenth that in this country.

Fortunately, the way to safer and more dependable methods of building is not difficult to find. For many years the manufacturers of building materials have been bringing continually to the attention of architects improved methods and means of constructing relatively or actually fireproof buildings. The possibilities offered by these methods and materials have undoubtedly led the way to better building, which is a long step in the right direction, but there seems to be little reason why a much larger proportion of the country's buildings should not be so constructed that fire, if not wholly preventable, would at least be so confined and localized by use of modern "slow burning" construction that loss of life would nearly always be avoided.

It cannot be claimed that use of these advanced building methods or the employment of fire-resisting materials are precluded by reason of their costs. The rapidity with which American forests are disappearing and the small progress which is being made in reforestration have caused a steady dwindling of the lumber supply and a correspondingly steady increase in the cost of frame construction, while during exactly the same period the introduction of improved methods into the manufacture of clay products of different kinds and their standardization and production on a larger scale have caused the prices at which they are sold to drop to a point where their cost is but very little more than that of lumber, and this small difference in cost is more than offset in a few years by the smaller expense of upkeep and the reduction in the cost of fire insurance. Frame construction is not necessarily to be condemned, because proper precautions in design and construction will make it proof against rapid combustion and hold fire within prescribed limits.

A great responsibility — that of leadership — belongs to the architectural profession in America. The average client knows comparatively little about building and even less of the relative costs of building and upkeep and the merits of different building materials. It is because of his limited knowledge that he requires the architect. The client rightfully regards his architect as a master of the science of building and is prepared, ordinarily, to follow his advice, much as he would obey the direction of his physician or his lawyer were the question medical or legal, and the architect's function should be correspondingly more than supplying an excellent floor plan clothed with a pleasing exterior.

Leadership in an advance toward improved forms of building could hardly be expected of the building trade, the function of which, ordinarily, is to execute or construct what is designed and planned by the architect. The use of steel construction, which makes possible the huge buildings being erected all over the country, if it was not invented by an architect at least owes its phenomenal development largely to the architects who have availed themselves of the advantages which it offers, and the wide use of fireproof construction will be promoted when the architects of America definitely assume the responsibility of leadership toward that end. It may be said that the development of steel construction was an absolute necessity for the growth of American cities, but equally necessary—and vastly more important—is the prevention of the losses of property and human lives which go on unceasingly under present methods of building.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED PROFESSIONAL & DESIGN INTERESTS WITH SPECIAL REFERENCE TO AVAILABLE MATERIALS

IT WILL BE THE PURPOSE IN THIS DEPARTMENT TO ILLUSTRATE AS FAR AS PRACTICABLE MODERN INTERIORS FURNISHED WITH ARTICLES OBTAINABLE IN THE MARKETS, AND THE EDITORS WILL BE PLEASED TO ADVISE INTERESTED READERS THE SOURCES FROM WHICH SUCH MATERIAL MAY BE OBTAINED

VIEW OF CORTILE TOWARD STAIRWAY ARCADE AND LOGGIA

HOUSE OF HENRY FORBES BIGELOW, ESQ., BOSTON

BIGELOW & WADSWORTH, ARCHITECTS

The walls are cream colored stucco with architraves and caps in gray cement and floor of red brick

Interiors Adapted from the Italian

PART I

By WALTER F. WHEELER

OF the many qualities which unite to render the arts of Italy so enduringly satisfying there is none which is stronger than what might be called the combining of practicability in its highest form with beauty of appearance. While this admirable quality appears in many of the arts it is particularly evident in domestic architecture, for in much of such work the necessary utilities are so clothed with a garb of architectural grace that the result is a well balanced and finished work, never overdone or made futile and fussy by the addition of unnecessary details.

It may be this practical quality which commends the Italian style for use in modern American homes, and since the success of architects and decorators in its interpretation is having the effect of causing its wide use, a study of some of its characteristics may be of interest. Italian Domestic Interior Architecture would be a topic upon which volumes might be written, but what is intended in these pages is an inquiry into the interior architecture of the country villa or the simpler forms of the urban palazzo as it existed in Northern Italy during the fifteenth and the early part of the sixteenth centuries, a type which is especially adapted for use in America today. It is the purpose of these articles to point out some of the characteristics and possibilities of the use of this style, to explain proportions, methods of treatment of walls, ceilings, doors and other details which may be of help, and to present illustrations of notably successful work which has already been done in America.

The dwelling of an Italian family, whether in city or country, and today as well as in former centuries, is intended to be first of all a home. In either location the plan of the house would not present essential variations. The entrance doorway probably opened into a hallway which led straight to what was usually the heart of the house—the courtyard or *cortile*, generally at the center of the building and open to the sky. The rooms of all floors fronted or opened upon this courtyard or upon the colonnade which often surrounded it, the plan of the house thus making it complete in itself and more or less shut off from the outside world; even the windows facing the street, when the building was a city home, were often mere loopholes—narrow, vertical apertures in the walls—unless for the sake of architectural emphasis larger openings were desired; as already said, the building was a home, and was regarded as belonging primarily to the family.

The ground floor of an Italian home—the space not taken up by the *cortile*—would be arranged to serve various domestic purposes; here would be the kitchens, serving rooms, store rooms and the living quarters for servants and other household departments, sometimes entered from a separate doorway but quite as often reached from the entrance which led to the main quarters. From this ground floor a stairway, somewhat modest and placed between two walls in most instances, would lead to the main floor just above, where would be placed the important rooms of the house, the family sleeping rooms being often upon another floor, with possibly still another story higher up containing additional sleeping rooms or quarters for servants. Such, in brief and in the main, was—and still is—the plan of the Italian home, whether in city or country.

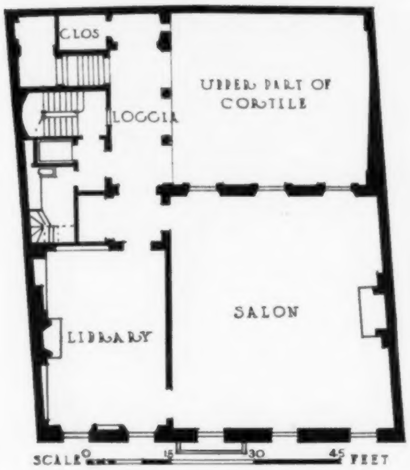
In Italy there has always been the preference, which obtains today in America, for a few rooms of ample size rather than a larger number of small rooms. Unless the building were the home of a family of considerable importance, or of some ecclesiastic of exalted rank, the rooms might not exceed in number those required by an American family today. The ceilings, however, particularly upon the main floor, would be of considerable height, which is desirable in a climate where the temperature frequently rises to a scorching heat, and windows, at least such as opened onto a *cortile* or an interior loggia, would probably be of ample size, opening nearly to the ceiling. Upon this main floor the Italian architect would make the most of the area which conditions placed at his disposal, the aim being to gain the full effect of space where it existed and to simulate its appearance where actual space was lacking. A well planned Italian house always affords ample spaces between openings in the walls. Much of the reserve or reticence which is characteristic of the style consists in the use of a few appropriate and carefully selected fittings rather than of a multiplicity of small objects, and the skill with which they are placed adds greatly to the general excellence of the effect; a successful arrangement, particularly when the pieces used are of characteristic Italian broad and generous lines, requires wall spaces of suitable dignity to afford fitting backgrounds.

As an unusually attractive example of excellent proportions, and having the added merit of being such as are adaptable to American use, there is included here the plan of a residence in Boston built upon the model of an urban palazzo of moderate size. The planning as well as the fixing of the proportions is the result of careful study of many of the best examples of the period. The size and shape of the city plot in this instance made impossible the extending of the building around the *cortile*, but in accordance with excellent precedent the structure is planned upon two of its sides, the walls upon the remaining sides being stuccoed. To relieve their severity these walls are paneled and hung with wooden trellises, and as a concession to the cold of

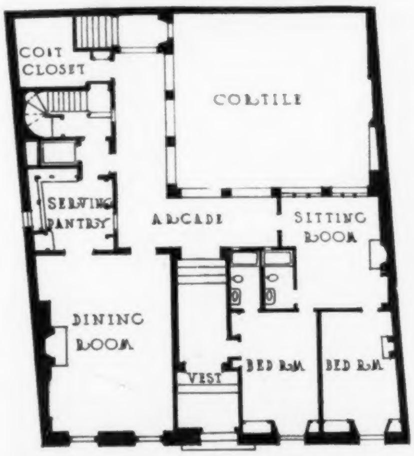
an American winter the *cortile* is roofed with glass. This plan shows the stairway placed where it is readily accessible and yet not given the elaborate and monumental treatment which developed in a later period; here its function is to serve as a means of passage from floor to floor, and not as a vehicle for architectural or decorative enrichment.

The Italian style depends for success almost wholly upon care in handling proportions to create an effect of spaciousness, and the use of good judgment in selecting materials which afford judicious contrasts. As representative of a room in an Italian house of the type under discussion an analysis of the interior illustrated upon this page may be helpful. This drawing room corresponds to the chief formal apartment of an Italian palazzo. As may be seen from the plan of the main floor, page 115, the room is of excellent proportions, the three windows facing south into the *cortile* being far more important than three other windows facing the street. All door and window openings are placed where they preserve the formal effect, but with an intentional disregard of exact symmetry. Wall spaces are not so cut up that opportunity for the suitable arrangement of furnishings is lost. The chimneypiece is placed where it secures the architectural balance of the room as seen from either of the doors through which it might be entered; dimensions of the fireplace opening, 5 feet high by 5 feet 6 inches wide, are entirely correct for an interior of this type and size, and above the fireplace is a simple but extremely well designed mantel of cement. The walls of this spacious drawing room are of rough troweled plaster of a color which varies between a pale gray and a deep cream and possesses texture which gives no suggestion of bareness but seems rather to be intended as an effective foil for the richness of the tapestries and portraits hung against it. The color of the plaster is varied because it was obtained by coats of different tones, the last of which was wiped off, exposing the underlying shade. Woodwork of windows is treated with extreme simplicity and although almost hidden in the deep plaster reveals is painted to match the walls about it. The baseboard is merely a narrow fillet to protect the walls. The floor is of wide chestnut boards possessing vigorous grain, secured with wooden pegs and finished in low color tones.

Drawing Room or Salon in House of Henry Forbes Bigelow, Esq., Boston. Bigelow & Wadsworth, Architects
The wall shown is about 42 feet long with a ceiling height of 18 feet



Main Floor Plan



Ground Floor Plan

Stairway from the Cortile, House of Henry Forbes Bigelow, Esq.

The ceiling of this room is of open timbers; the heavier beams which cross the room at right angles divide the area into nine spaces of almost equal size, these spaces being subdivided by smaller timbers upon a higher level. All this woodwork, which is of chestnut with very little finish, is polychromed with a moderately rich renaissance decoration in which red, blue and other colors are combined. There is no striving to produce a gorgeous and lavish effect, but the atmosphere is that of restrained and thoughtful luxury.

The characteristics of Italian architecture of this type may be summed up under several headings:

Spaciousness. Italian architecture places the greatest value upon simplicity of plan and spaciousness of rooms. Better by far one or two rooms of ample dimensions than a larger number of rooms too small to be effective from an architectural point of view and too contracted for practical use. By the use of good proportions and comparatively few furnishings this appearance of spaciousness is often created.

Ample Wall Spaces. Where use is made of only a few carefully selected pieces of furniture it is highly important that these few be arranged with considerable care, and this makes necessary the provision of broad wall spaces. An Italian architect would always visualize the appearance of a room when furnished, planning for the maintaining of balance and placing utilities such as doors or windows where they would not interfere with the architectural composition.

Severity. Since this style depends upon success in handling contrasts it follows that severity often provides the most effective foil for objects which may be more elaborate. Severity, however, need never be bareness, and even the most severe object may be architectural by reason of its beauty of texture and its fine restraint of such lines as it may possess.

Proportions. More than many architectural types the Italian villa style demands excellence of proportions; this is particularly true since it does not often employ decoration to an extent which would make it the chief consideration. For this reason the architect who would succeed in interpreting this apparently simple but very exacting style must give heed to dimensions of his rooms and even to what might seem to be minor details. The proportions given in these pages are excellent for rooms of their several types.

Crudity of Finish. It would be a mistake to carry out the finish in rooms of this type to the point where every surface or line is worked out to a

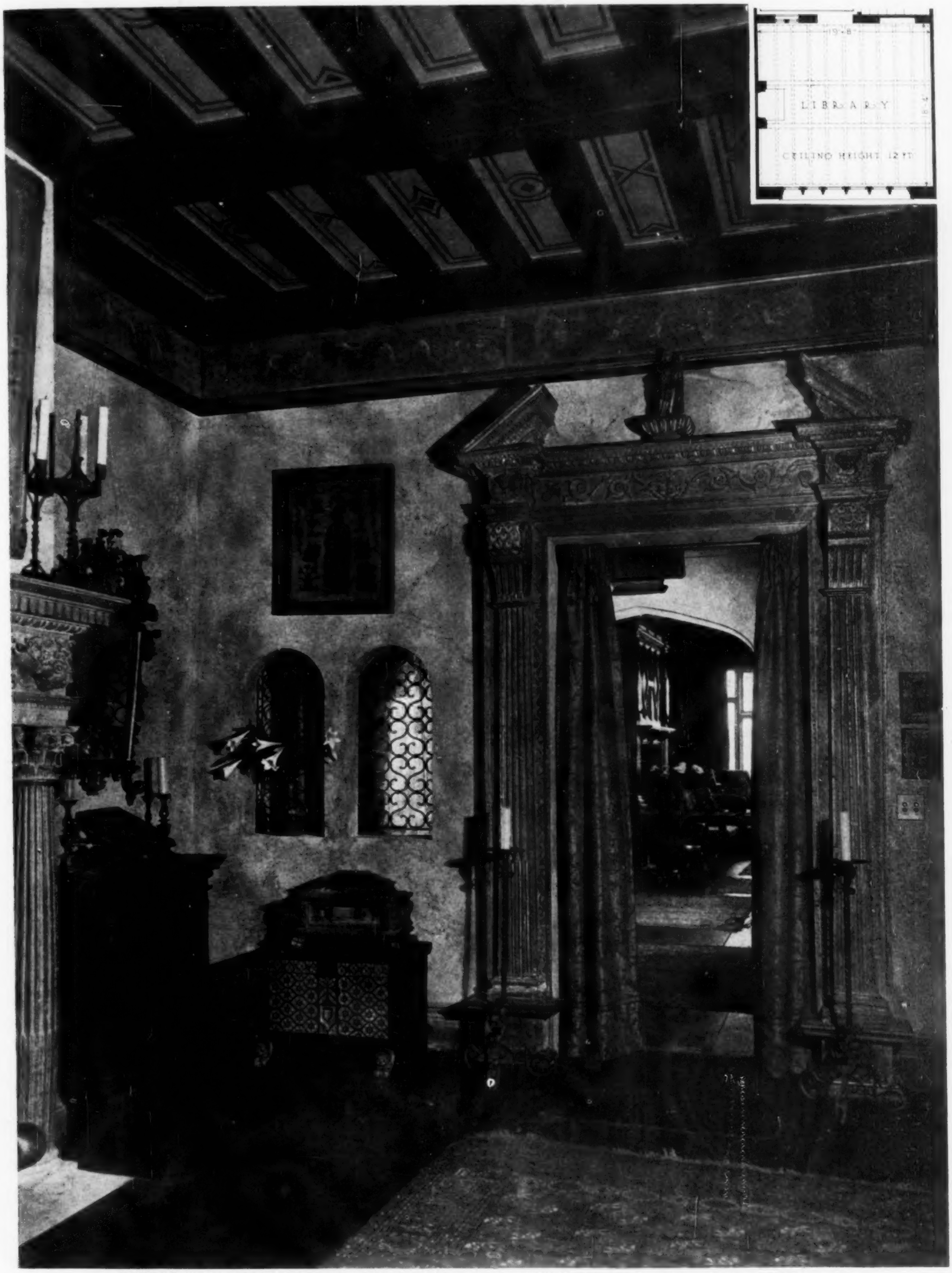
mathematical smoothness or evenness. Refinement, to be successful in work of this character, should take the form of discrimination in regard to design and scale; particularly in large domestic interiors, the effect gains greatly from a slight crudity in execution.

Plaster. The various plaster finishes which are useful in developing interiors in houses of this type are produced with the trowel in the same way which the plasterer used in the sixteenth century. Dry color mixed with plaster was employed at that time and is still used, and for interiors which are but sparsely furnished or where but few objects are to be hung upon the walls, polychrome in all-over design is particularly helpful.

A Principal Room in the Famous Davanzati Palace, Florence

Color. The unusually large scale in which Italian domestic interiors are often designed, and the ample sizes of rooms, permit a use of far more color than might be desirable in decoration of some of the more intimate types. There are no colors which are particularly suitable, therefore any may be used, subject only to the restraints and limitations imposed by good taste and careful judgment.

A Low, Vaulted Refectory of a Florentine Palace, Typical of Minor Apartments in Large Italian Villas
This form of interior permits of effective frescoes



LIBRARY IN ITALIAN STYLE IN HOUSE OF J. THEUS MUNDS, ESQ., NEW YORK, N. Y.

JAMES E. CASALE, ARCHITECT

Walls of rough buff plaster with woodwork of dull, rich blue antiqued with gold. Floor and ceiling stained chestnut, latter with panels and frieze in polychrome. Furniture largely of walnut

STUDIO IN HOUSE OF LEONARD M. THOMAS, ESQ., NEW YORK, N. Y.

F. BURRALL HOFFMAN, JR., ARCHITECT

Walls and vaulted ceiling of slightly roughened cream plaster, providing admirable background for tapestries. Mantel of cast cement, woodwork polychromed in pattern. Italian and French furniture

Scale. Because rooms of this character are of larger area and greater height than rooms of most other architectural types used for like purposes in American houses, a much bolder and more vigorous scale must be adopted. Ordinarily architects and decorators fear to use a scale sufficiently robust and the result is apt to be over-refined to the point of weakness. It would perhaps be better, if an error must be made, to err in the opposite direction by establishing a scale over-robust. There is nothing more important in architecture of this type than the use of suitable scale.

Vigorous Mouldings. Closely allied to scale, in architecture of this character, is the question of strong, vigorous mouldings, highly necessary to interiors where walls are so often of plain, rough troweled plaster. One function of a moulding is to cast a shadow; another function is to relieve the eye wearied by too great expanses of wall, and these offices are fulfilled only when mouldings are crisp, bold and virile. Such mouldings may be seen in some of these illustrations and details of a few will be given in later articles of this series.

As an aid to adapting architecture of the early renaissance to modern living there are now being made excellent reproductions of Italian furniture. Certain modern craftsmen are faithfully reproducing original pieces with much of the finish which makes them valuable, not with the idea of deception by reproducing patina and even worm holes, but in the hope of placing within reach of the many what are now, or else long have been, the prized possessions of a few great museums or of a few princely Italian families. The American furniture workers who are making possible the use in modern homes of furniture which possesses the symmetry and grace of that produced in Italy during the fifteenth and sixteenth centuries, are not the only craftsmen who have caught something of the inspiration which produced the original work. Makers of fabrics, wrought iron, tiles, pottery of many kinds, stained glass and workers in all the arts which had a part in creating the Italian villa or palazzo, are producing work which rivals in excellence the work of the older craftsmen, and since in a sense all of these arts are the servitors of architecture, it is its part to choose and employ, to select and to use, the work of them all. Such accessories of architecture will receive due attention in these articles, the hope being that there may result some definite help to architects who may be working in the Italian styles.

Dining Room in the House of J. Theus Munds, Esq., New York. James E. Casale, Architect
This lower story room with glassed-over cortile beyond suggests the usual Italian treatment

The Execution of Furniture and Decoration Commissions

ABOUT one year ago a limited survey was made by THE ARCHITECTURAL FORUM to determine the interest of architects in the question of furniture and decoration. As a result of the interest manifested at that time the Decoration and Furniture Department of THE FORUM was instituted at the beginning of this year. Incidentally, a more complete analysis has been made and it is now possible to give facts and figures regarding the handling of furniture and decoration commissions in architects' offices.

Information received from approximately 1,000 offices in various sections of the country indicates use of four methods of carrying out interior decoration commissions under the supervision of the architect. These include:

1. The recommendation and employment of a high class firm of interior decorators to carry out the entire project in co-operation with the architect.
2. The employment of an interior decorator who acts in the capacity of a professional buyer.
3. Direct purchasing of all furniture, fabrics and objects of art by the architect himself.
4. Purchasing by the client, in consultation with the architect.

Our analysis shows that approximately 70% of the large volume of furniture and decoration controlled by architects is carried out through methods 1 and 2 as outlined here. In dealing with high class decorators, who to a great extent maintain their own show rooms, the procedure calls for conferences between the architect and the decorator and the presentation of sketch suggestions by the decorator in accordance with general requirements provided by the architect. Accompanying these sketches and suggestions are price keys which indicate the total cost. The general requirements of the architect are of course based on consultation with the owner, and the final sketches are submitted to the owner for his approval. The architect then obtains orders for the decorator to proceed with the work and supervises the carrying out of the contract in a manner somewhat similar to his supervision of the actual building construction.

In operating under method 2 the general layout of the rooms, together with any necessary interior sketches, is prepared by the architect and submitted for the approval of the owner. The architect then employs a professional purchaser who brings to his office all necessary samples of fabrics, wall paper and other decorative materials. When this display is properly arranged the client is called in for final decision. From many offices we have reports that this method of executing an interior decorator's commission is highly satisfactory. The interior decorator usually profits by the discounts allowed, while the architect is paid a direct commission for design and supervision in a manner similar to that covering the actual building operations. Approximately 20% of this work is carried out completely by the architect, including the purchasing.

Another interesting method which we have found is used to a limited extent, and which might well be encouraged, is that in which the owner (or else the owner's wife) assumes the part of the professional purchaser and submits for the opinion of the architect samples of fabrics and types of furniture which have been selected.

Almost without exception we find the architect's opinion favorable toward controlling choice of furniture and decorations, and it is evident that many architects who have never before given serious consideration to this phase of architectural practice are now recognizing the possibility of controlling the finishing touches to the buildings which they have designed. Not long ago, in order to determine the trend of thought on this subject, we selected at random 20 houses, already built, ranging in cost from $60,000 to $100,000. We approached the architects who had designed these houses and asked them if it would be possible to get photographs of the living rooms. 17 of the 20 were unwilling to have photographs published because the effect of the interior architectural designs had been almost ruined by indifferent decorations and furniture. In one of the remaining three cases the decorations of the living room had been carried out under the supervision of the architect and were entirely satisfactory; in the second, the interior decorations had been done in a very attractive manner by a firm of interior decorators who were not employed through the architect but kept their work in harmony with his design, while in the third instance the furniture and decorations had been controlled by the owner who happened to be a man of excellent taste and understanding.

Inquiring further regarding the 17 examples of architects' interior designs ruined by unwise decorations and furnishings, we found that in 15 instances the architects had not even suggested to their clients the idea of their supervising decorations and furniture and that in two cases the work had been done wholly by professional decorators who evidently did not know their business. In almost every instance we found that the policy of the architects, who in previous years gave no consideration to the handling of the interior decorations, had changed with a realization of the importance of controlling this feature of architectural design.

We have been surprised by the number of letters from architects which report that invariably the furniture and decoration problems of large buildings are placed under their supervision, often as a part of their original contracts. There are still many unsettled business problems affecting this activity, including not only methods of charging the owner for service rendered but the relations between the architect and the wholesale trade. Various points involved in this connection will be discussed in succeeding issues of THE ARCHITECTURAL FORUM.